

MACHINE SERVICE BULLETIN #34

SUBJECT: K"O" AND KA"O" MACHINES

DATE: May 10, 1926

TO ALL OFFICES:

We are releasing herewith an illustrated Service Bulletin that completely covers the mechanism of the "O" series machines, both hand and automatic. In preparing this Bulletin, we used sixteen place machines, which were completely dismantled, reassembled and adjusted in the proper manner.

As these operations were performed, we not only illustrated them but included any text that was necessary to clarify the points we wished to bring out, which has resulted in placing in the hands of our representatives a reference that will cover all service problems in connection with servicing these machines.

It is noted that we have also included a cross reference which gives the key to the exact operations that it is necessary to perform to remove the various units when it is necessary to adjust some particular portion of the mechanism.

Furthermore, a tool list is included that illustrates each tool and gives its number. These tools are also included in their respective places in the operations and they represent the exact kit of tools that was used when performing the various operations used when preparing this Bulletin.

In regard to requisitioning repair tools shown in this Bulletin, most servicemen have a kit which includes, with a few exceptions, those listed. Therefore, good judgment must be used in requisitioning additional tools, as the ones already on hand so closely represent the ones we recommend that they will, in most cases, answer the purpose.

On the other hand, a serviceman's kit must include the special tools, as a complete kit is necessary if the serviceman is to follow our instructions.

NOTE: We will not supply or approve of the purchase at the Company's expense, tools not listed, for as stated before, the kit as shown is sufficiently complete to handle our work.

Finally, the information contained herein is completely indexed, with the result that any part of it may be instantly referred to. With this information at hand in this form, our representatives




MACHINE SERVICE BULLETIN #34 -#2

should experience no difficulty in correctly servicing the "O" series machines. Needless to say, it is very important that those responsible for the upkeep of our machines familiarize themselves with this information in this form as quickly as possible. This includes those who have had previous training and who feel that they already understand this mechanism thoroughly, as in this Bulletin is shown not only the correct manner in which to dismantle the machine, reassemble and adjust it, but the shortest and right way to perform these operations.

If our representatives do not take advantage of this information and apply it to their daily needs, our efforts will not have accomplished their purpose. It should be borne in mind that in helping yourselves you are rendering a better service to our users, the Company and your District, resulting in the mutual benefit of all concerned.

Each District receiving this Bulletin is held responsible for it and we would request an acknowledgment on the enclosed receipt card, which is to be forwarded to this office without delay.

FMS:MEW

  
General Service Manager

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# HOW TO DISMANTLE, REPAIR, ADJUST AND ASSEMBLE THE KÖ AND KÄÖ SERIES MACHINES.

HOLD THIS SCREW FROM TURNING WHILE UNSCREWING HINGE ROD

## REMOVING CARRIAGE FROM MACHINE

1

WITH SCREWDRIVER UNSCREW THIS HINGE ROD

2

RELEASE CARRIAGE LOCKS FROM LOCKING LEDGE AND RAISE CARRIAGE - HOLDING IT WITH LEFT HAND.

LEFT HAND

3

REMOVE THIS L.H. CARRIAGE BUMPER SPRING TO KEEP IT FROM FALLING INTO MACHINE.

R.H. CARRIAGE BUMPER SPRING.

SCREW DRIVER

SPRING.

### NOTE

IF L.H. BUMPER SPRING SHOULD HAPPEN TO FALL INTO MACHINE - DO NOT TAKE OFF PIN - ETC. BUT FORCE SCREW DRIVER BETWEEN COILS OF SPRING AND LIFT OUT.

4

REMOVE THE HINGE ROD AND THE R.H. CARRIAGE BUMPER SPRING.

CARRIAGE MAY NOW BE LAID ASIDE TO BE WORKED UPON INDEPENDENTLY.



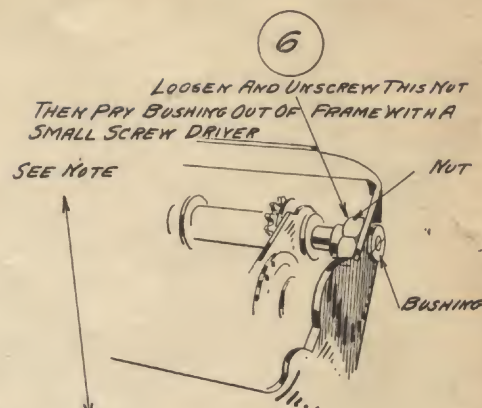
# HOW TO DISMANTLE THE REGISTERING DIAL SHAFT

PLATE 2



5  
UNHOOK THIS SPRING HERE  
AND ALLOW IT TO HANG ON  
LOWER LOCKING FINGER.

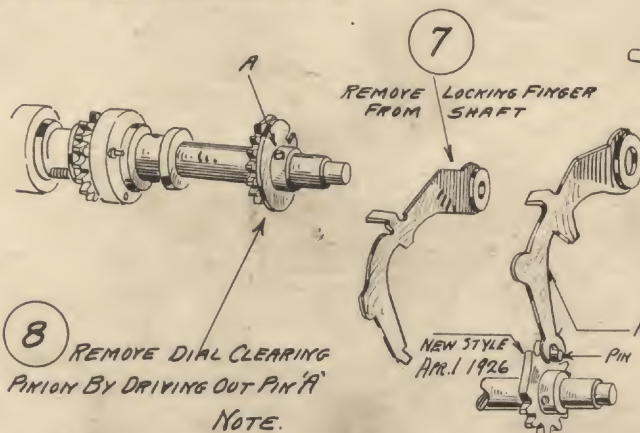
WITH THUMB OF LEFT HAND  
LIFT LOCKING FINGER SO  
SPRING MAY BE EASILY UNHOOKED



SEE NOTE

6  
LOOSEN AND UNSCREW THIS NUT  
THEN PRY BUSHING OUT OF FRAME WITH A  
SMALL SCREW DRIVER

NUT  
BUSHING

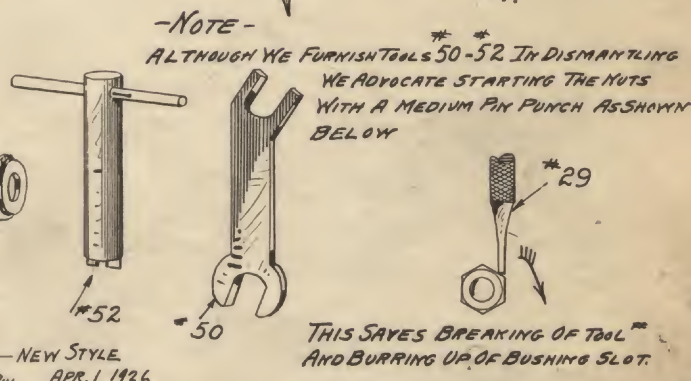


7  
REMOVE LOCKING FINGER  
FROM SHAFT

8  
REMOVE DIAL CLEARING  
PINION BY DRIVING OUT PIN 'A'

NOTE.

PINS SHOULD BE "STARTED" WITH ONE QUICK SHARP BLOW  
WITH A PUNCH LARGER THAN THE PIN. AFTER STARTING PIN  
DRIVE IT THROUGH WITH A PUNCH OF SMALLER SIZE  
THIS WILL SAVE MUTILATING PIN AND PINIONS  
USE ANVIL # 55



-NOTE-

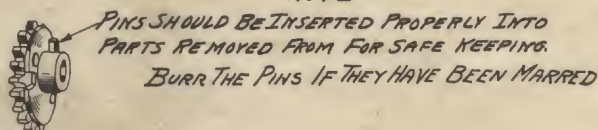
ALTHOUGH WE FURNISH TOOLS 50-52 IN DISMANTLING  
WE ADVOCATE STARTING THE NUTS  
WITH A MEDIUM PIN PUNCH AS SHOWN  
BELOW

OTHER END OF SHAFT CONTAINS A SIMILAR  
NUT- LOOSEN NUT AND PRY OUT BUSHING AS STATED ABOVE.

- IMPORTANT -  
DO NOT INTERCHANGE THESE NUTS AND BUSHINGS.  
- LAY CARRIAGE ON FELT OR CLOTH -

IMPORTANT.

BE SURE TO USE A BABBIT OR LEAD ANVIL WHEN  
DRIVING OUT PINS TO PREVENT DISTORTION OR MUTILATION OF PARTS

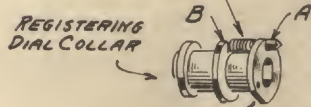


NOTE

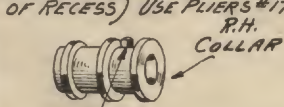
PINS SHOULD BE INSERTED PROPERLY INTO  
PARTS REMOVED FROM FOR SAFE KEEPING.  
BURR THE PINS IF THEY HAVE BEEN MARKED

9  
DRIVE OUT PIN 'B' AND DRAW  
AS MANY UNITS AS WANTED FROM  
SHAFT

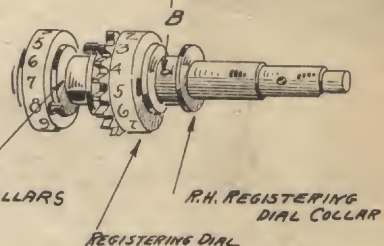
NOTE  
THIS SPRING AND PLUNGER MAY BE REMOVED  
WITHOUT DISMANTLING SHAFT BY WITHDRAWING THE PLUNGER OUT OF  
HOLE 'A' WITH SMALL PLIERS AND LIFTING IT OUT OF SLOT 'B'



REGISTERING DIAL COLLAR  
MAKE SURE THAT THIS COLLAR  
EMBODIES A FLAT HERE TO AVOID  
INTERFERENCE WITH WEDGE



REGISTERING DIAL COLLAR  
INSERT PINS SO THEY WILL  
NOT BE LOST



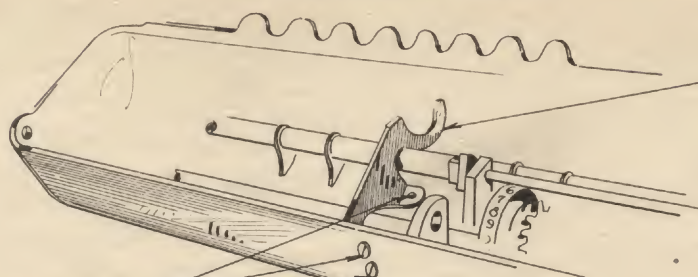
- IMPORTANT -

WHEN REMOVING THESE REGISTERING UNITS  
MAKE NOTE OF THEIR PLACES SO THEY  
MAY BE REASSEMBLED IN THEIR SAME  
LOCATIONS

DISMANTLED PARTS



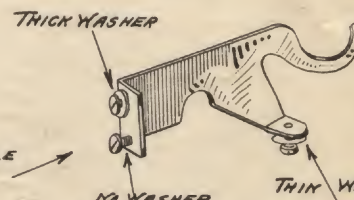
# HOW TO DISMANTLE THE SUPPORTING BRACKET, TRIP ROD, TRIP ROD FINGERS, AND POSITIONING FINGERS



10

REMOVE SUPPORTING BRACKET FOR CARRIAGE SHAFTS.

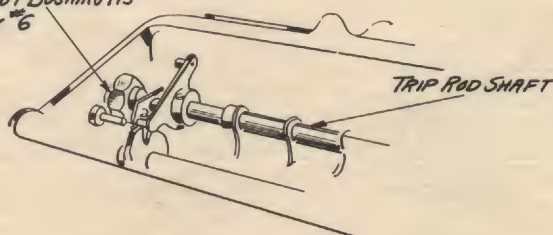
REMOVE THESE THREE SCREWS AND DETERMINE THE WASHER USED WITH SCREWS. IT IS IMPORTANT THAT THE SAME WASHERS BE USED IN THE SAME PLACE WHEN REASSEMBLING.



FOR EXAMPLE

IT IS SAFEST TO INSERT THE SCREWS WITH WASHERS IN PROPER PLACES BEFORE LAYING THESE PARTS ASIDE

11 LOOSEN NUT AND PRY OUT BUSHING AS IN OPERATION 6

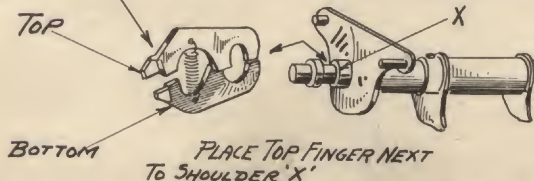


12

AFTER REMOVING NUT AND BUSHING LIFT THE TRIP ROD SHAFT OUT OF CARRIAGE.

13

REMOVE TRIP ROD POSITIONING FINGERS. NOTE - MARK WHICH IS THE TOP OR BOTTOM SO IT MAY BE REASSEMBLED THE SAME WAY.



TRIP ROD FINGER

SPACING COLLAR

PIN

SHAFT

COLLAR

ASSEMBLE PIN SO IT WILL NOT BE LOST.



14

TRIP ROD FINGER

NOTE

COLLAR SHOULD BE MARKED AT LEFT SIDE SO IT MAY BE REASSEMBLED THAT WAY AND NOT END FOR END CAUSING TOO MUCH END PLAY.

DRIVE OUT PIN AS IN OPERATION 8 USING LEAD ANVIL AND PROPER PUNCHES AND REMOVE COLLAR



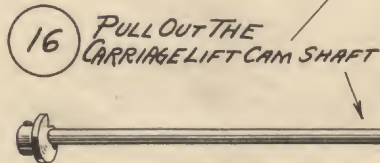
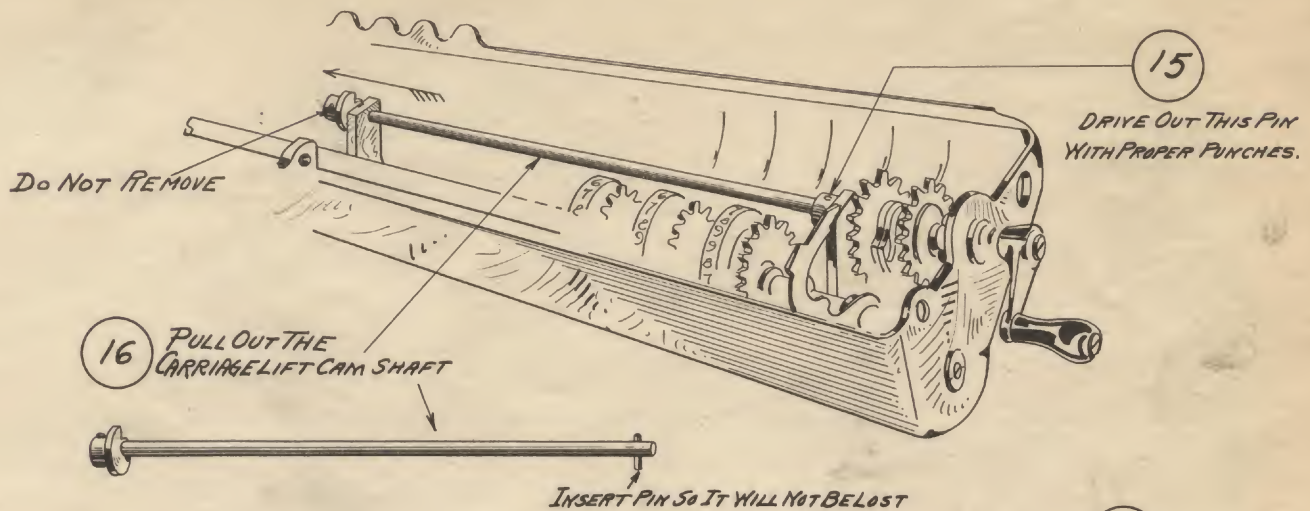
SPACING COLLAR FOR TRIP ROD FINGERS

— IMPORTANT NOTE —

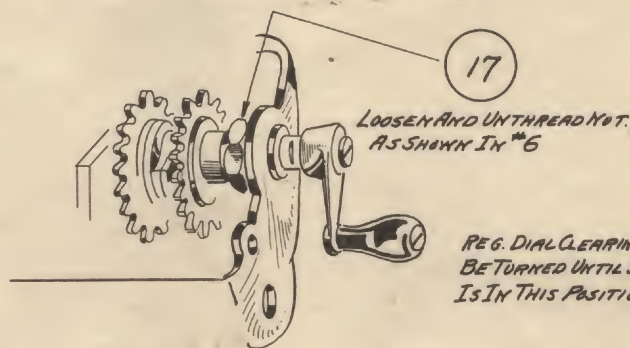
WHEN REMOVING THESE PARTS FROM THE ROD MAKE NOTE AND SO LAY ASIDE THE PARTS THAT THEY MAY BE SELECTED AND REASSEMBLED IN THEIR ORIGINAL LOCATIONS; DO NOT RELY UPON THESE PARTS REMAINING INTERCHANGEABLE.



SHOWING REMOVAL OF CARRIAGE LIFT CAM SHAFT, CLEARING GEARS AND CRANK SHAFT.

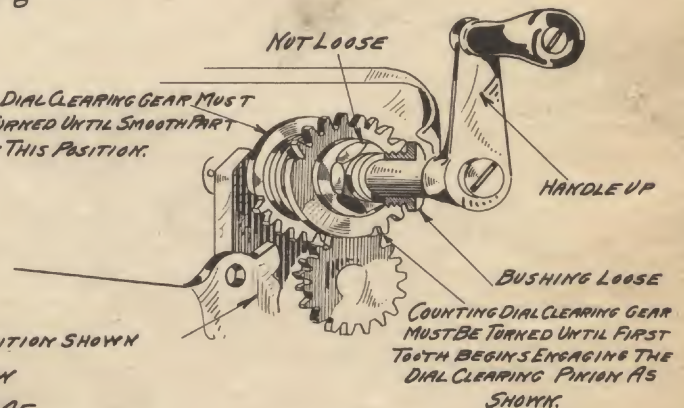


INSERT PIN SO IT WILL NOT BE LOST



18

LOCATE GEARS AND HANDLE AS SHOWN BELOW



19

WITHDRAW CARRIAGE CRANK SHAFT.

TO DO THIS HOLD CLEARING GEAR UNIT WITH LEFT HAND IN POSITION SHOWN. WITHDRAW SHAFT SLOWLY - WATCH FOR THE PLUNGER TO SHOW. AS SOON AS PLUNGER SHOWS - MOVE GEAR UNIT TO SIDE OF FRAME, USING THE INSIDE OF BUSHING HOLE IN FRAME TO KEEP PLUNGERS UNDER CONTROL, WITHDRAW SHAFT AGAIN SLOWLY AND AS PLUNGERS EMERGE HOLD THEM FROM FLYING OUT WITH THE THUMB AS SHOWN.

- NOTE -

IF THE SHAFT IS VIOLENTLY PULLED OUT PLUNGERS AND SPRINGS WILL FLY OUT AND BECOME LOST

- NOTE -

CRANK SHAFT CANNOT BE WITHDRAWN UNTIL THE HANDLE AND GEARS ARE IN THE LOCATIONS SHOWN ABOVE

20

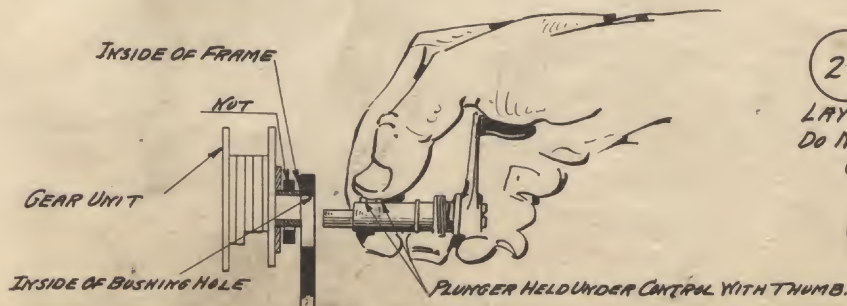
LIFT OUT THE COUNTING DIAL CLEARING GEAR WITH NUT AND LAY ASIDE.

21

LAY ASIDE THE CRANK HANDLE AND SHAFT. DO NOT DISASSEMBLE CRANK HANDLE PLUNGERS OR BUSHING AT THIS TIME

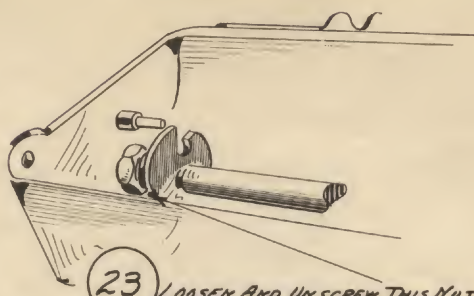
22

REMOVE REGISTERING DIAL CLEARING GEARS FROM CARRIAGE AND LAY ASIDE.



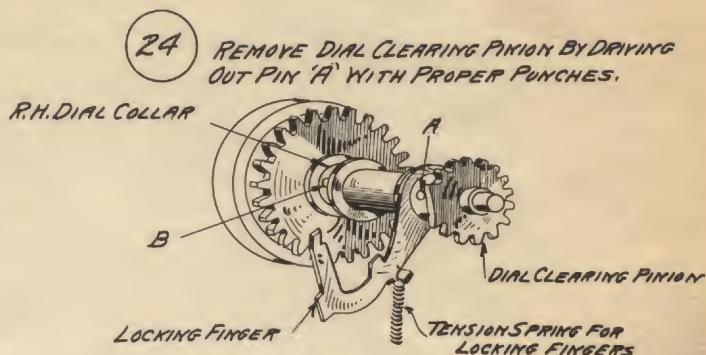


# HOW TO DISMANTLE THE COUNTING DIAL SHAFT.



23 LOOSEN AND UNSCREW THIS NUT AS PER OPER. #6

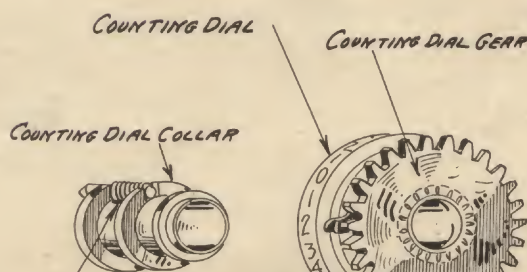
SAME TO BE DONE AT RIGHT END  
- IMPORTANT -  
DO NOT INTERCHANGE THESE NUTS OR BUSHINGS



24 REMOVE DIAL CLEARING PINION BY DRIVING OUT PIN 'A' WITH PROPER PUNCHES.

25 REMOVE LOCKING FINGER FROM SHAFT.

26 DRIVE OUT PIN 'B' WITH PROPER PUNCHES  
REMOVE R.H. COUNTING DIAL COLLAR  
AND AS MANY DIALS AND COLLARS  
AS NECESSARY



SEE NOTE FOR OPERATION #9

NOTE  
THIS SPRING AND PLUNGER MAY BE  
REMOVED WITHOUT DISMANTLING SHAFT  
SEE NOTE FOR OPER. #9

R.H. COUNTING DIAL COLLAR



INSERT PIN IN PART SO IT WILL NOT BE LOST.

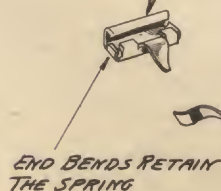
- IMPORTANT -

WHEN REMOVING THESE COUNTING DIAL UNITS  
MAKE NOTE OF THEIR PLACES SO THEY MAY BE  
REASSEMBLED IN THEIR PROPER LOCATIONS.

- NOTES -

WHEN REMOVING SCREWS SUCH AS THESE - DO  
IT CAREFULLY. USE THE RIGHT SIZE SCREW DRIVER  
DO NOT LET IT SLIP AND MARK THE ENAMEL  
OR INJURE SCREW SLOTS

DECIMAL POINTER



END BENDS RETAIN THE SPRING

SPRING FOR TENSION  
ASSEMBLED IN POINTER

DIAL DECIMAL POINTER

WHEN IT BECOMES NECESSARY TO  
REMOVE A POINTER TAKE OUT SCREW  
AND SLIP IT OFF BAR.

RIVET

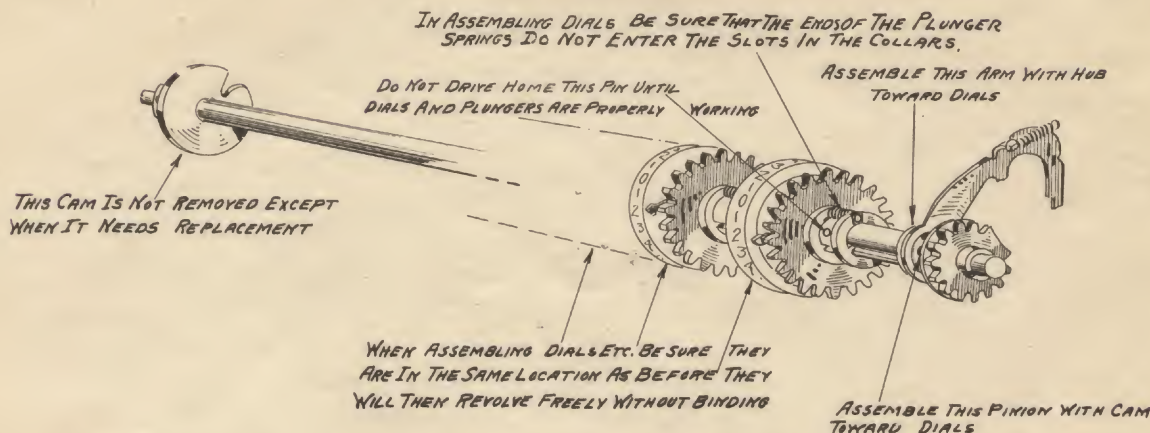
- NOTE -

WE DO NOT ADVOCATE THE REMOVAL OF POINTER BARS  
IF IT SHOULD BE ABSOLUTELY NECESSARY DRIVE OUT  
THE RIVETS PROPERLY (CUT OFF HEAD WITH CHISEL)



# NOTES ON THE ADJUSTMENT, REPAIR AND ASSEMBLY OF THE K0 AND K0C CARRIAGE

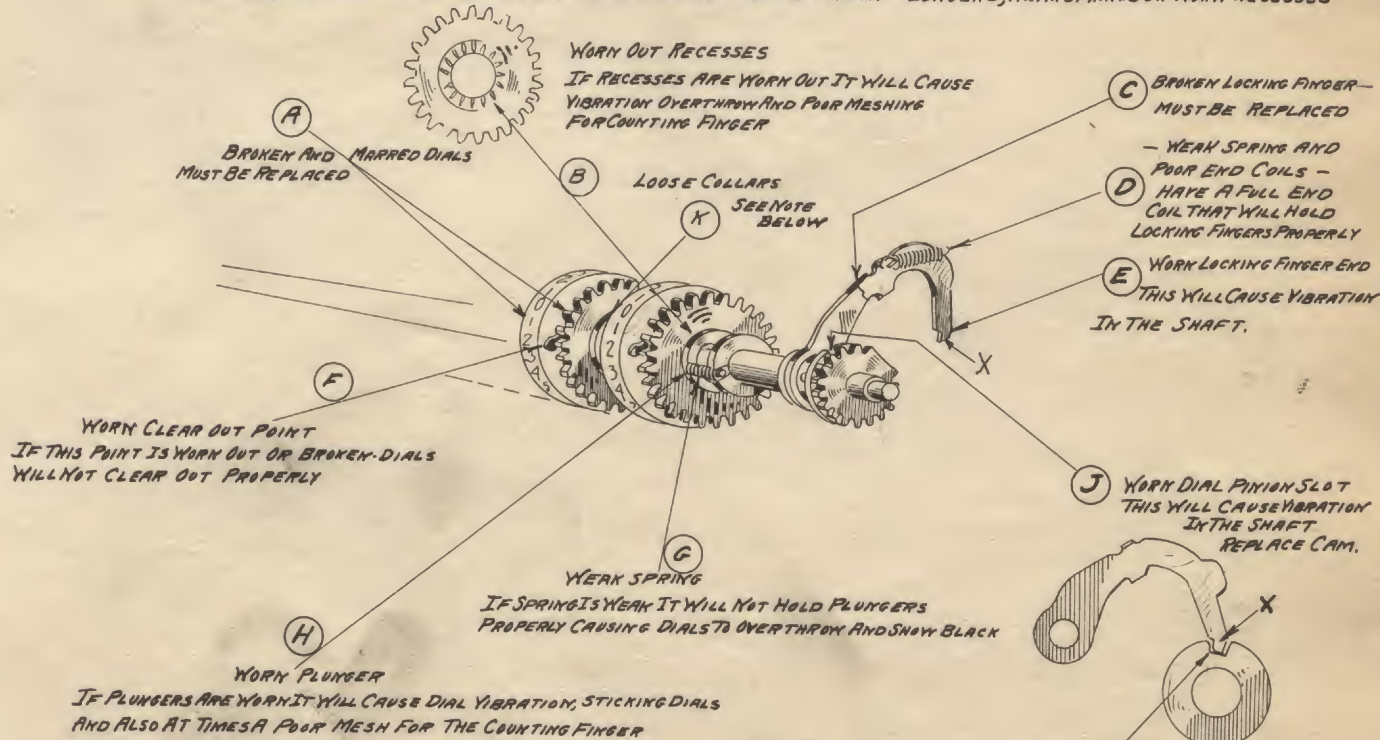
## NOTES ON ASSEMBLING COUNTING DIAL SHAFT.



BEFORE INSERTING PINS BE SURE THE LARGE AND SMALL HOLES LINE UP WITH SHAFT HOLES-DRIVE PINS IN SECURELY WITH A PUNCH LARGER THAN THE PIN DO NOT TAP, PEEN OR MUSHROOM THESE PINS

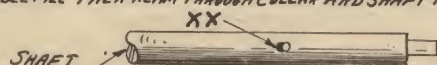
## NOTES ON REPAIR AND ADJUSTMENT OF COUNTING DIAL SHAFT

TEST THE TENSION OF THE DIALS TO SEE THAT YOU HAVE NO WORN PLUNGERS, WEAK SPRINGS OR WORN RECESSES



— NOTE —

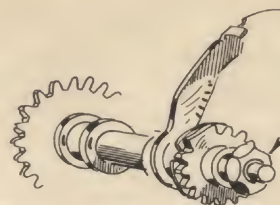
LOOSE COLLARS CAUSING END PLAY OF DIALS MAY BE REPAIRED BY REMOVING PIN. DEPRESS COLLARS DOWNWARD TIGHTLY. LOOKING THROUGH HOLE TO DETERMINE SLACK. REMOVE COLLAR. FILING SLACK AT 'XX' WITH RD. NEEDLE FILE THEN REAM THROUGH COLLAR AND SHAFT FOR A LARGER PIN.



WHEN PARTS ARE WORN WE ADVOCATE REPLACEMENT. HOWEVER LOCKING FINGER MAY BE PEENED WIDER AT 'X' IN EMERGENCY CASES



# PLATE 7 ASSEMBLING THE COUNTING DIAL SHAFT, CLEARING GEAR AND CRANK SHAFT.



27 PLACE THE TWO NUTS (ONE ON EACH END) ON SHAFT AND INSERT SHAFT INTO SHELL.

## NOTE

AFTER PERFORMING OPERATION #28 TEST THE SHAFT FOR END PLAY AND BIND ALSO SEE THAT DIALS ARE CENTRAL IN WINDOWS OF CASE.

IF SHAFT HAS END PLAY INSERT A THIN WASHER BETWEEN BUSHING AND SHOULDER OF SHAFT

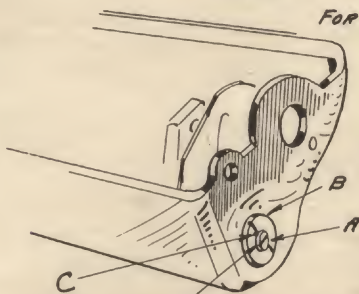
TAKING CARE HOWEVER TO INSERT THIS WASHER AT THE END WHICH CENTRALIZES THE DIALS IN WINDOW.

IF THE SHAFT BINDS ONE BUSHING MAY BE FILED SLIGHTLY SHORTER

TAKE CARE TO FILE THAT BUSHING WHICH WILL NOT DISTURB THE PROPER POSITION OF DIALS IN WINDOWS; OR MESH OF COUNTING FINGER

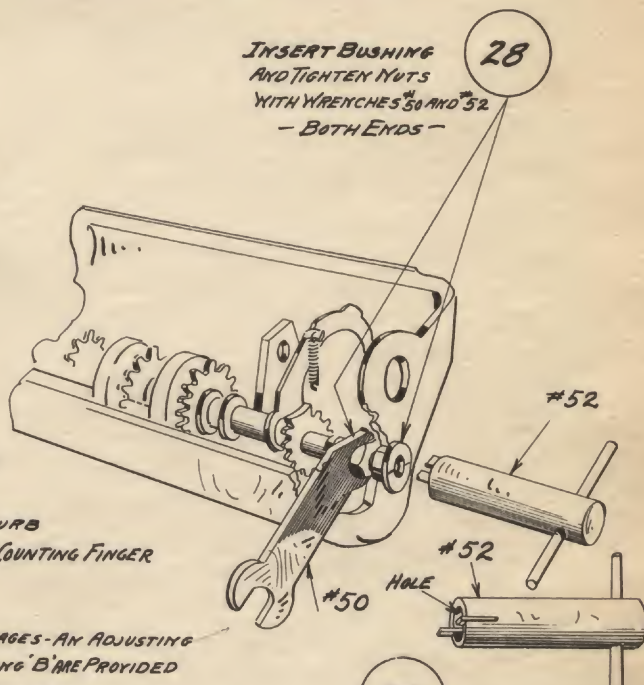
## - NOTE -

FOR THE 'D' SERIES CARRIAGES - AN ADJUSTING SCREW 'A' AND A BUSHING 'B' ARE PROVIDED TO TAKE CARE OF THE ADJUSTMENT ABOVE. THIS MAY BE ADOPTED LATER FOR ALL MODELS



ADJUST THESE SCREWS TO TAKE OUT BIND OR END PLAY BUT KEEP DIALS CENTRAL IN WINDOWS.

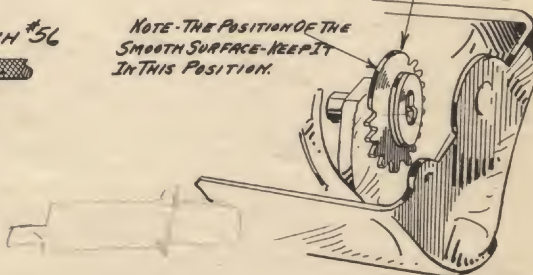
WHEN ADJUSTED PROPERLY BE SURE TO SEAL EACH SCREW AT 'C' TO KEEP IT FROM TURNING LOOSE (USE SPECIAL PUNCH #56)



28 INSERT BUSHING AND TIGHTEN NUTS WITH WRENCHES #50 AND #52 - BOTH ENDS -

29 PLACE THE REGISTERING DIAL CLEARING GEAR INTO BRACKET.

NOTE - THE POSITION OF THE SMOOTH SURFACE - KEEP IT IN THIS POSITION.

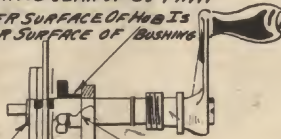


30 SEE SKETCH OF OPERATION #19 AND HOLD THE COUNTING DIAL CLEARING GEAR WITH NUT AGAINST THE INSIDE OF FRAME AS SHOWN.

31 HOLD PLUNGERS WITH THUMB AND INSERT PLUNGERS AND CRANK SHAFT - KEEPING PLUNGERS UNDER CONTROL. SEE SKETCH #19

POSITION THE GEAR IN FINGERS WITH SMOOTH SURFACE LOCATED AS IN OPER. #19 - HOLD GEAR UP SO THAT THE INNER SURFACE OF HUB IS IN LINE WITH INNER SURFACE OF BUSHING HOLE.

32 INSERT SHAFT HALF WAY (SEE REPAIRING NOTE ON PLATE 8) BEFORE INSERTING SHAFT



INSERT SHAFT ONLY THIS FAR BEFORE NEXT OPERATION #33

HOLD FIRMLY AGAINST SIDE OF FRAME

33 MOVE THE UNITS DESCRIBED IN OPER. #32 AGAINST REG. DIAL CLEARING GEAR AND INSERT SHAFT FULL DISTANCE

34 TIGHTEN NUT ON BUSHING - TO DO THIS IT IS NECESSARY TO REMOVE THE CRANK HANDLE SO WRENCHES #50 AND #52 MAY BE USED REPLACE HANDLE WHEN NUT IS TIGHT.

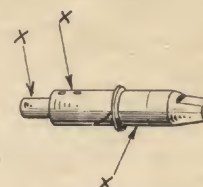
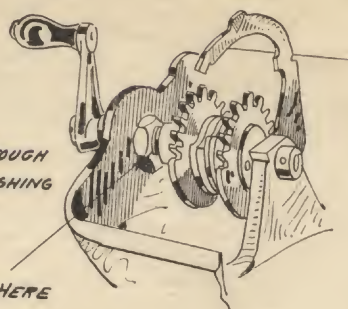


NOTES ON THE REPAIR AND ADJUSTMENT OF CLEARING GEAR AND CRANK UNIT.

IF SHAFT BINDS AND HAS NOT ENOUGH  
END PLAY-FILE THE END OF BUSHING  
SLIGHTLY.

IF THE UNIT HAS TOO MUCH  
END PLAY INSERT A WASHER HERE  
OR TRY A NEW BUSHING.

DO NOT INSPECT FOR PLAY UNTIL CARRIAGE LIFT  
CAM SHAFT HAS BEEN INSERTED.

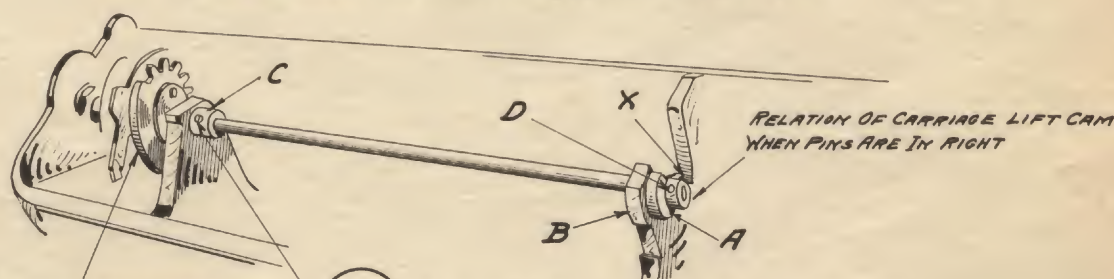


IF SHAFT BINDS ALTHOUGH IT HAS PROPER  
END PLAY IT MAY BE CAUSED BY THE PLATING.  
HAVING ROUGHED UP TO OVERCOME THIS  
REMOVE THE PLATING AT X WITH FINE SAND  
PAPER.

- NOTE -

DO THIS TO ALL NEW SHAFT REPLACEMENTS  
AND INSPECT OLD SHAFTS BEFORE INSERTION.

ASSEMBLING THE CARRIAGE LIFT CAM SHAFT



SMOOTH SURFACE HERE

IF THE REGISTERING DIAL CLEARING  
GEAR IS HELD IN THIS POSITION THE LARGE END OF  
HOLE WILL BE ON TOP.

35

ASSEMBLE THE CARRIAGE LIFT CAM SHAFT.  
BE SURE THAT THE HOLES LINE UP (LARGE END OF HOLE ON THE TOP)  
BEFORE DRIVING IN PIN.

REPAIR NOTE ON ABOVE

- IMPORTANT -

CAM 'A' IS SUBJECT TO SOME WEAR AT 'X' WHEN REMOVAL IS NECESSARY DO NOT DRIVE OUT  
PIN 'D' BUT DRIVE OUT PIN 'C' AND REMOVE SHAFT ENTIRELY. PLACE SHAFT ON A LEAD ANVIL  
AND DRIVE OUT PIN 'D' - IF THIS IS NOT DONE AND PIN 'D' IS REMOVED WHILE IN SHELL THE BLOWS  
MAY BREAK THE LUG 'B' OR SERVE TO ELONGATE THE BEARING IN 'B' THIS WILL RENDER THE  
SHELL BEYOND REPAIR.

WHEN INSTALLING A NEW CAM IT IS WELL TO LINE REAM THE PIN HOLE  
IN DRIVING OUT PIN 'C' USE THE PROPER PUNCHES AND DO NOT MARK OR MUSHROOM THE PIN.

- NOTE -

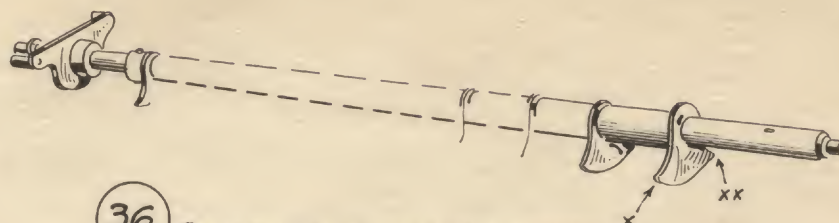
IF CARRIAGE LIFT CAM WEARS MUCH AT THIS POINT (X) IT WILL DROP THE CARRIAGE  
TOO SOON AND PREVENTS THE REGISTERING DIALS FROM CLEARING OUT PROPERLY

CAM MUST BE REPLACED  
WHEN WORN TOO MUCH TO CAUSE  
TROUBLE





# ASSEMBLING THE TRIP ROD AND INSERTING IT INTO SHELL

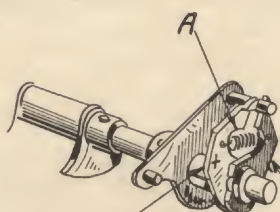


- 36 ASSEMBLE THE COLLARS AND FINGERS IN PROPER RELATION AS BEFORE DISMANTLING AND PROPERLY POSITIONED AS STATED HERE.

NOTE.

KEEP PARTS CLEAN AND FREE FROM DIRT OR CHIPS WHEN ASSEMBLING.

NOTE THAT THE TRIP ROD FINGER IS NOT SYMMETRICAL AND IF CARE IS NOT TAKEN IT MAY BE ASSEMBLED WRONG AND WILL NOT FUNCTION.



THIS TOP FINGER SHOULD HAVE BEEN MARKED SO IT MAY AGAIN BE PLACED ON TOP.

- 38 ASSEMBLE POSITIONING FINGER

NOTE THAT THE LOWER FINGER IS ON THE OUT SIDE

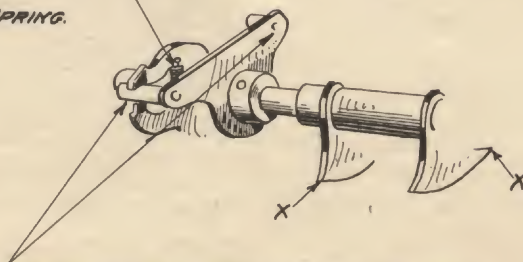
- 37 ASSEMBLE COLLAR AND DRIVE TAPER PIN IN PLACE.



THIS COLLAR SHOULD BE ASSEMBLED WITH THE SAME FACE TOWARD FINGER AS BEFORE THIS WILL INSURE LINING UP WITH PIN HOLE AND TIGHTNESS OF PARTS ASSEMBLED.

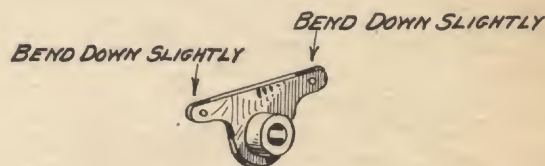
## NOTE-ON THE ADJUSTMENT AND REPAIR OF THE TRIP ROD

A STRETCHED SPRING HERE WILL NOT POSITION THE TRIP SHAFT PROPERLY AND WILL CAUSE TROUBLE  
RENEW THE SPRING.



THESE PINS RIDE ON CAMS AND ARE SUBJECT TO WEAR. IF TOO MUCH WORN - POINTS 'X' OF TRIP FINGERS WILL NOT ADVANCE FAR ENOUGH TO ENGAGE CLEAR OUT PINS IN DIALS.

PEENING SHOULD BE DONE WITH A PAIR OF PEENING PLIERS. #18



NOTE

IF THE MAJORITY OF COUNTING OR REGISTERING DIALS DO NOT CLEAR OUT PROPERLY MAKE THE ADJUSTMENT ABOVE AS NEEDED.



PEENING HERE WILL ELONGATE POINT IN DIRECTION OF ARROWS

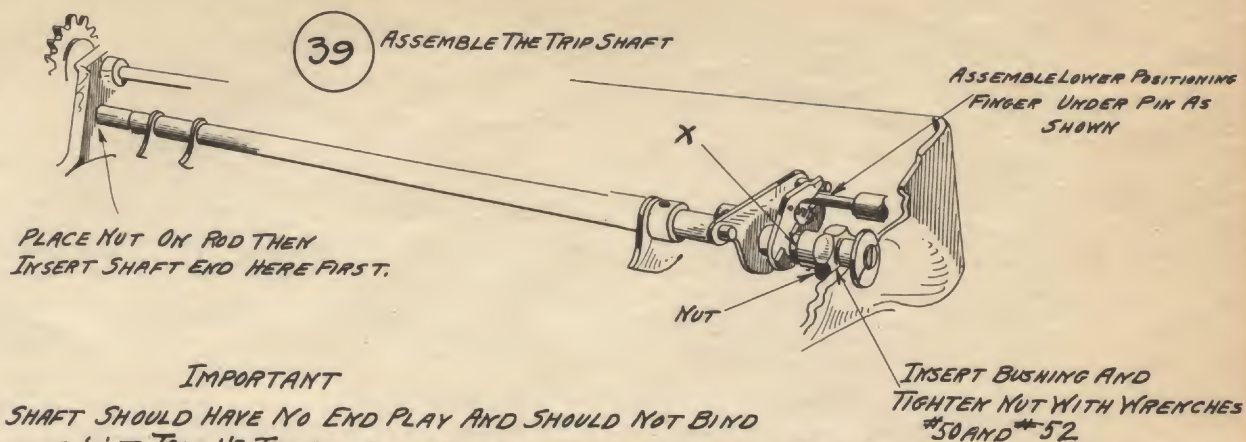
WHEN A FEW COUNTING DIALS THROW RED OR DO NOT CLEAR OUT THE FINGERS SERVING THESE DIALS MAY BE ADJUSTED AS ABOVE.

PEENING HERE WILL ELONGATE POINT IN DIRECTION OF ARROW DO NOT PEEN TOO MUCH OR IT WILL INTERFERE WITH CLEAR OUT PINS. WHEN ONLY A FEW REGISTERING DIALS HANG UP OR DO NOT CLEAR OUT IT REQUIRES THE ADJUSTMENT ABOVE.



# ASSEMBLY OF THE TRIP SHAFT INTO SHELL

PLATE 10



## IMPORTANT

TRIP ROD SHAFT SHOULD HAVE NO END PLAY AND SHOULD NOT BIND  
USE WASHER AT 'X' TO TAKE UP THE END PLAY AND FILE BUSHING IF SHAFT BINDS

## ADJUSTMENT NOTE

TRIP ROD FINGERS MUST NOT INTERFERE WITH DIAL GEARS ON COUNTING AND REGISTERING DIAL SHAFTS  
FINGERS MAY BE BENT TO RIGHT OR LEFT AS NEEDED OR WASHER INSERTED AT 'X' IN SOME CASES.

## NOTES ON ASSEMBLING REGISTERING DIAL SHAFT.

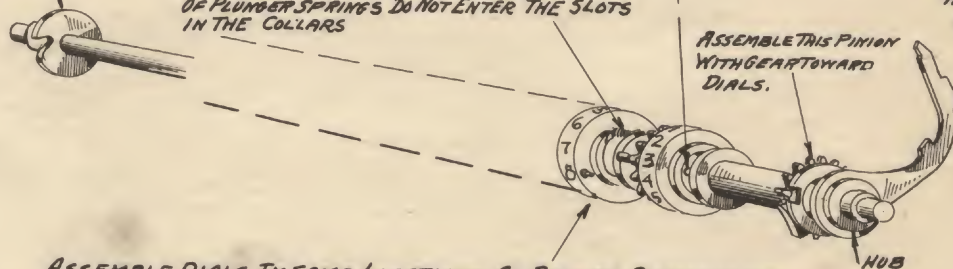
THIS CAM IS NOT REMOVED EXCEPT WHEN IT NEEDS REPLACEMENT

DO NOT DRIVE HOME THIS PIN UNTIL DIALS AND PLUNGERS ARE PROPERLY WORKING

IN ASSEMBLING DIALS SEE THAT THE ENDS OF PLUNGER SPRINGS DO NOT ENTER THE SLOTS IN THE COLLARS

ASSEMBLE THIS PINION WITH GEAR TOWARD DIALS.

ASSEMBLE THIS ARM WITH HUB AWAY FROM PINION AS SHOWN



ASSEMBLE DIALS IN SAME LOCATIONS AS BEFORE DISMANTLING  
THEY WILL THEN FUNCTION MORE FREELY THAN IF MIXED.

BEFORE INSERTING PINS BE SURE THE LARGE HOLES IN COLLAR LINE UP WITH LARGE END OF SHAFT HOLES- DRIVE PINS IN SECURELY WITH A PUNCH LARGER THAN THE PIN. DO NOT TAP, PEEN, OR MUSHROOM THESE PINS.

## NOTES ON REPAIRS AND ADJUSTMENT

TEST THE TENSION OF THE DIALS- SEE THAT THEY REVOLVE FREELY WITH OUT BINDING  
- SEE ALSO PLATE 6 -

INSPECT THESE PINS FOR WEAR

BROKEN AND MARRED DIALS MUST BE REPLACED

THIS SPRING AND PLUNGER MAY BE TAKEN OUT WITHOUT DISMANTLING SHAFT

THIS FINGER SOMETIMES BREAKS WHEN ADJUSTING

LOOSE COLLARS MAY BE TIGHTENED BY MEANS SHOWN ON PLATE 6

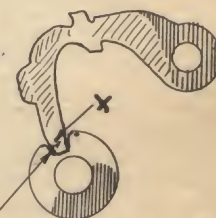
IF THESE GEARS WEAR THEY SHOULD BE REPLACED.  
(DIALS, GEARS AND PINS ARE ONE UNIT)

WHEN SLOT OF CAM IS WORN REPLACE CAM

WORN FINGER POINT AT 'X' WILL CAUSE VIBRATION IN THE OPERATION OF SHAFT

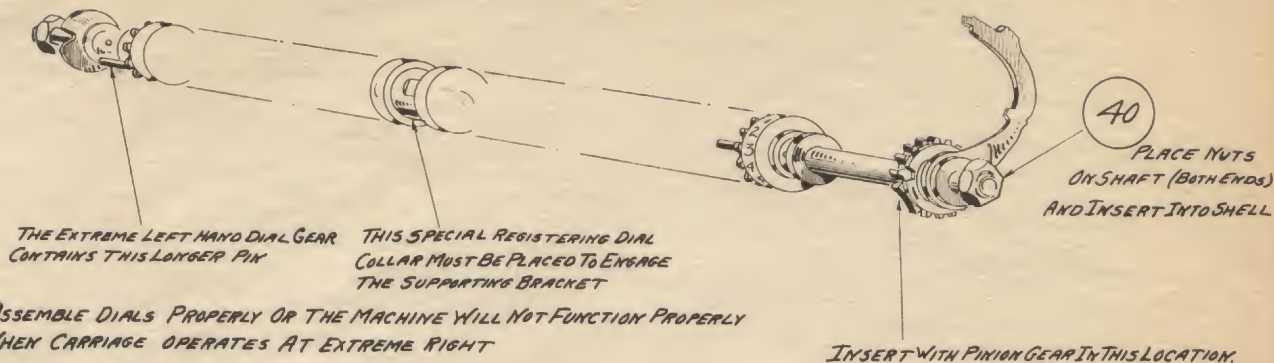
DRIVE PIN IN WITH PROPER PUNCH ON LEAD ANVIL

POINT 'X' MAY BE PEENED WIDER IN EMERGENCY CASES.

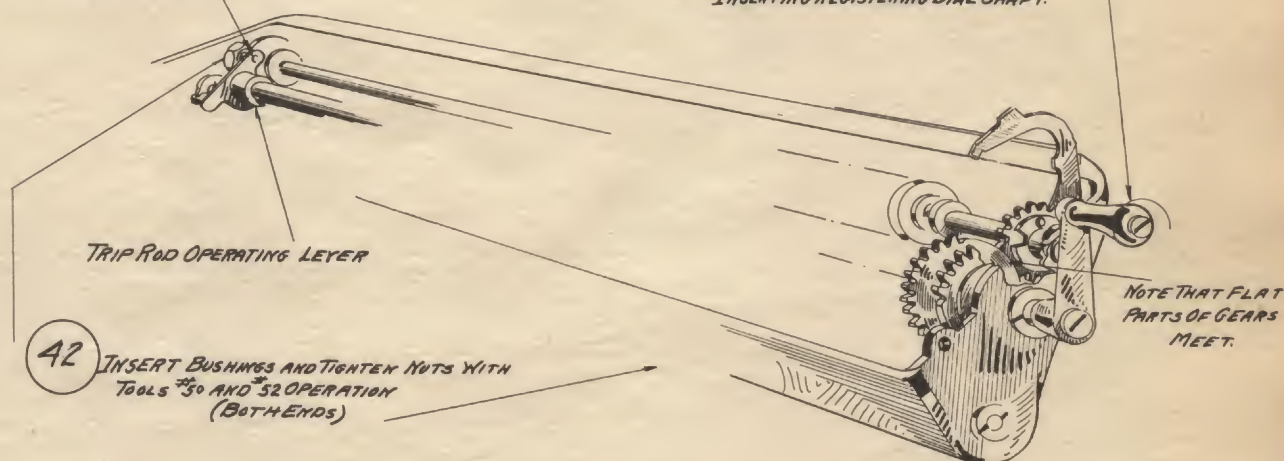




NOTES ON REASSEMBLING REGISTERING DIAL SHAFT.

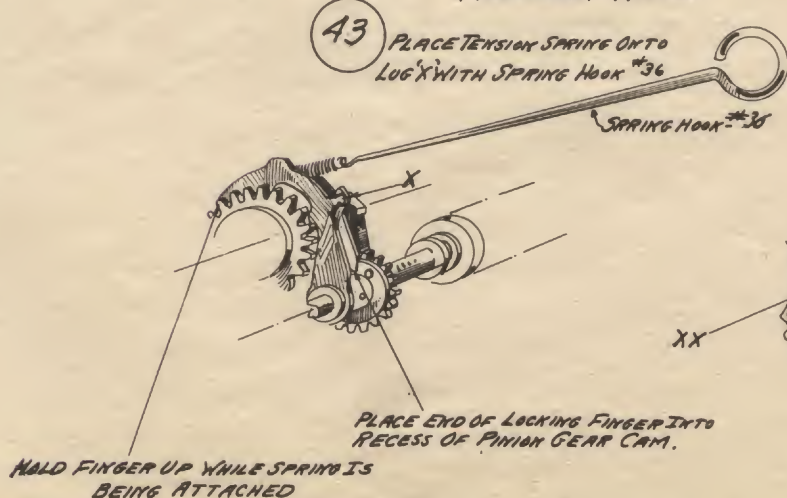


NOTE THAT PIN OF TRIP ROD OPERATING LEVER IS IN CAM RECESS



ADJUSTMENT AND REPAIR NOTES ON ABOVE UNIT -  
SEE PLATE 7 NOTE FOR OPERATION #28

ASSEMBLY NOTE



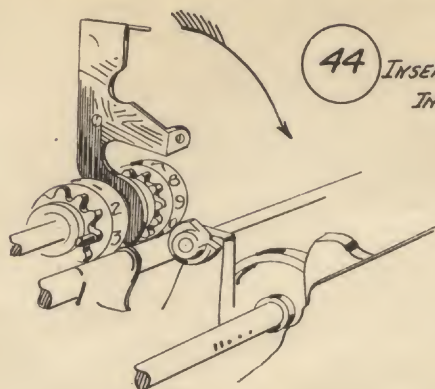
ADJUSTING NOTE  
AFTER OPER. #43 TEST THE UNIT BY OPERATING THE CRANK HANDLE. IT MUST NOT BIND.  
IF BINDING EXISTS, DETERMINE WHICH FINGER IS CAUSING THE FRICTION AGAINST THE SIDE OF CLEARING GEARS AND BEND FINGER TO GIVE FREEDOM



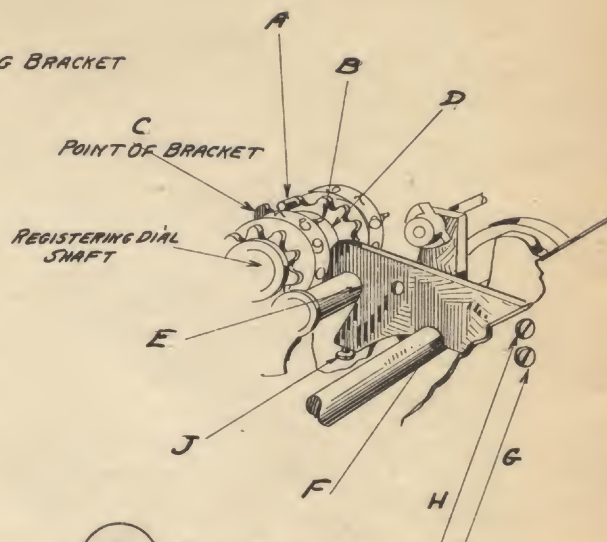
IN BENDING FINGERS OR MAKING ADJUSTMENTS BEAR IN MIND THAT ENDS 'XX' OF THESE FINGERS MUST RIDE CAMS PROPERLY AND NOT SLIP OFF OR CROWD AGAINST THE TEETH OF PINION GEARS.



ASSEMBLY NOTES FOR THE SUPPORT BRACKET



44 INSERT SUPPORTING BRACKET INTO SHELL



45 INSERT SCREWS AND TIGHTEN WITHOUT MARRING SHELL OR MARRING SCREWS.

-IMPORTANT-

IF OLD PART IS REASSEMBLED -PLACE THE WASHERS. IF ANY, IN THEIR ORIGINAL PLACES AND TIGHTEN SCREWS.

IF REPLACED PART IS INSERTED TIGHTEN SCREWS-NO WASHERS THEN TEST FOR SPRING AND BIND OF THE SHAFTS.

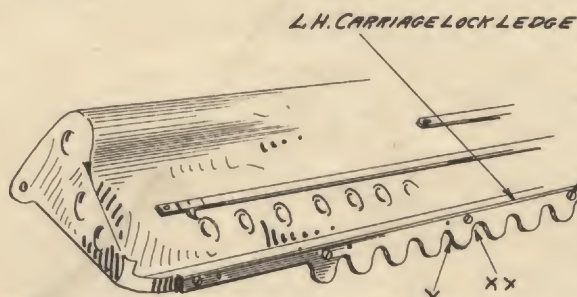
ADJUSTMENT NOTES.

THIS BRACKET IS DESIGNED TO SUPPORT THE THREE SHAFTS. WASHERS MAY BE PLACED AS NEEDED AT POINTS MARKED 'J'-H-'G'. TO ADJUST THE SUPPORTING POINTS 'F'-E-'D'- POINT 'C' IF SLIGHTLY OPENED WILL RELIEVE BIND AT 'D'- AND SLIGHT GRINDING AT 'F' OR 'E' MAY BE FOUND NECESSARY WHEN INSTALLING A NEW BRACKET.

IT IS IMPORTANT THAT THE REGISTERING DIAL SHAFT BE PROPERLY SUPPORTED AND HAS NO SPRING TO CAUSE TROUBLE.

POINT 'C' OF BRACKET MUST BE CENTRAL BETWEEN ENDS 'A' AND 'B' THIS MAY BE DONE AFTER ALL SCREWS ARE TIGHT AND A PAIR OF PLIERS USED TO BEND THE BRACKET AT ITS CENTER

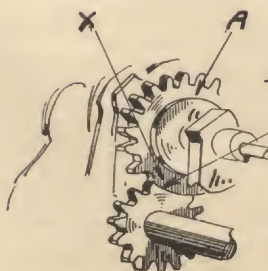
REPAIR NOTES



TO INSTALL NEW PART- REMOVE SCREWS- DO NOT DISTURB DOWEL PINS. REAM ENAMEL FROM DOWEL PIN HOLES OF NEW PART.

IMPORTANT. USE PROPER SCREW DRIVER AND DO NOT MAR SHELL OR MAR SCREWS

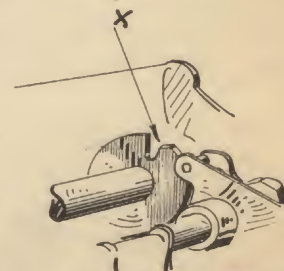
LOOK FOR WEAR AT 'X'-XX'- TOO MUCH WEAR WILL THROW THE REGISTERING DIAL GEARS OUT OF MESH WITH INTERMEDIATE GEARS AND GIVE WRONG RESULTS.



IMPROPER SEATING AT THIS POINT WILL NOT THROW THE PINION CLEARING GEAR FOR REGISTERING DIAL SHAFT OVER FAR ENOUGH CAUSING SHAFT TO HANG DOWN.

TO REMEDY THIS REMOVE GEAR 'A' AND PEEN METAL AT 'X' OUTWARD TO IMPROVE THE SEATING (DO NOT BIND GEARS) IN DOING THIS.

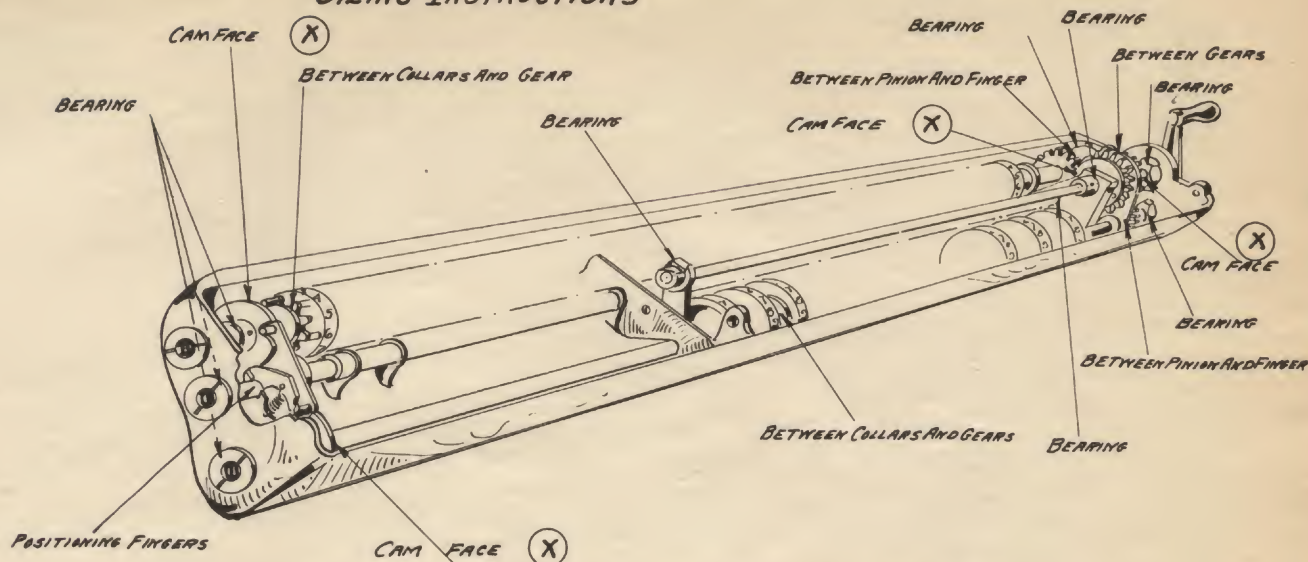
SAME METHOD MAY BE APPLIED TO THE COUNTING DIAL SHAFT.



FILING SLIGHTLY AT 'X' WILL RELIEVE HEAVY STARTING OF CRANK HANDLE WHEN OPERATING COUNTING DIAL SHAFT.



## OILING INSTRUCTIONS



USE ONLY OIL AND GREASE FURNISHED BY THE CO.

(X) DENOTES WHERE GREASE IS USED. DO NOT OIL OTHER PLACES TOO MUCH-TWO DROPS 3OR 4 TIMES A YEAR SHOULD BE ENOUGH.

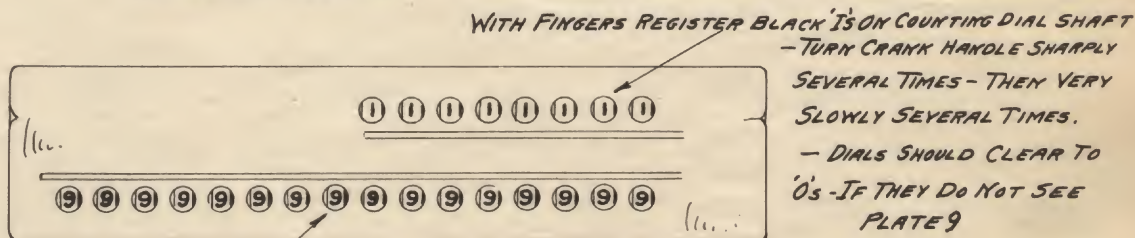
### NOTES ON PARTIAL DISMANTLING.

TO TAKE OUT TRIP ROD SHAFT REMOVE SUPPORTING BRACKET AND REGISTERING DIAL SHAFT ONLY.

TO TAKE OUT CARRIAGE LIFT CAM SHAFT-REMOVE THE SUPPORTING BRACKET ONLY

TO TAKE OUT COUNTING DIAL SHAFT: REMOVE SUPPORTING BRACKET. CARRIAGE LIFT CAM SHAFT. UNHOOK LOCKING FINGER SPRING. NOTHING ELSE NEED BE DISTURBED

### NOTES ON TESTING



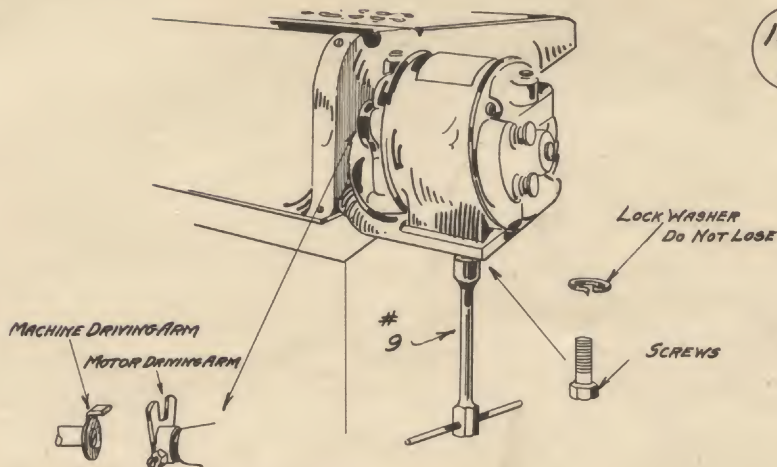
WITH FINGERS, REGISTER '9'S IN REGISTERING DIAL SHAFT - AND PROCEED TO TEST AGAIN AS ABOVE  
TEST ONLY ONE SHAFT AT A TIME.

TO TEST FOR PROPERLY FUNCTIONING DIALS IN REGISTERING DIAL SHAFT - TURN UP '9'S WITH FINGERS ON TWO DIALS AT A TIME - CLEAR OUT THESE DIALS VERY SLOWLY WATCHING THE '0'S OF THE TWO DIALS TO SEE THAT THEY WINK NINE TIMES - THIS WILL PROVE THAT THE PLUNGERS ARE FUNCTIONING PROPERLY.

TO TEST THE COUNTING DIALS PROCEED LIKEWISE BUT REGISTER '1'S AND NOTE SEVENTEEN WINKS ON THE DIALS INSTEAD OF NINE. IF TESTS ABOVE FAIL THE TROUBLE MAY BE WORN PLUNGERS - WEAK SPRINGS - WORN RECESSES OR BINDING OF GEARS - SEE PLATE 6



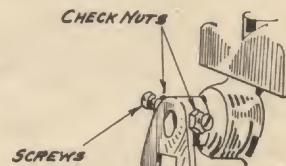
NOTES ON DISMANTLING BASE OF MACHINES  
KÖ AND KAÖ SERIES



MOTOR CAN NOT BE WITHDRAWN STRAIGHT OUT  
IT MUST BE TIPPED OR SWUNG OUT ACCORDING  
TO HOW DRIVING ARMS ARE LOCATED

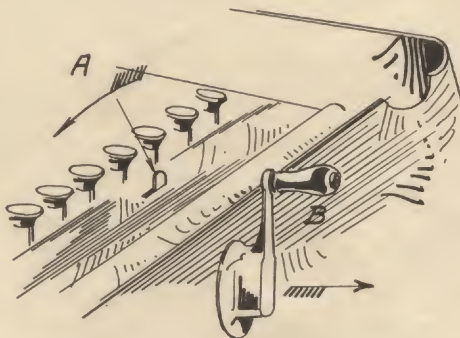
100  
A

REMOVE MOTOR WITH WRENCH SHOWN  
AND SET IT ASIDE



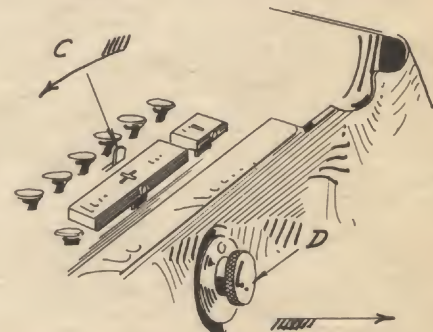
NOTE.

TO REMOVE MOTOR DRIVING ARM.  
LOOSEN CHECK NUTS WITH  $\frac{5}{16}$  WRENCH THEN  
LOOSEN SCREWS WITH LARGE SCREW DRIVER  
AND PULL DRIVING ARM FROM MOTOR SHAFT.



101

PRESS LATCH 'A' IN DIRECTION OF ARROW  
AND EXTRACT CRANK HANDLE 'B' OUTWARD

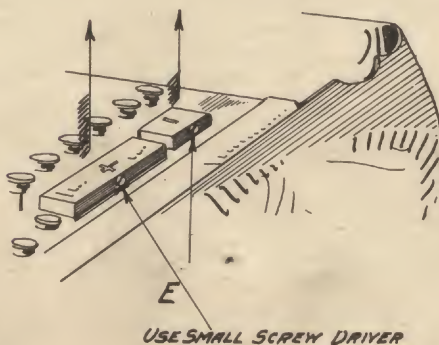


101  
X

PRESS LATCH 'A' IN DIRECTION OF ARROW AND  
PULL OUT THE CRANK HOLE COVER 'D'

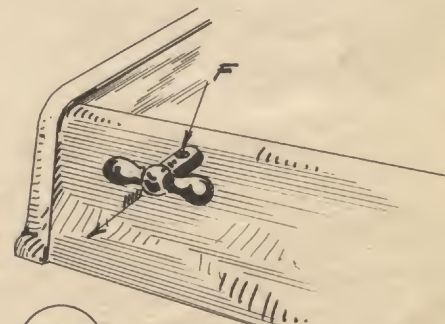
NOTE

AUTOMATIC MACHINES ARE SUPPLIED WITH A  
CRANK FOR USE IN EMERGENCY CASES.



102  
A

REMOVE SCREWS 'E' AND PULL THE  
'+' AND '-' BARS OFF STEMS (UPWARD)  
REPLACE SCREWS IN HOLES OF BARS AND LAY ASIDE.



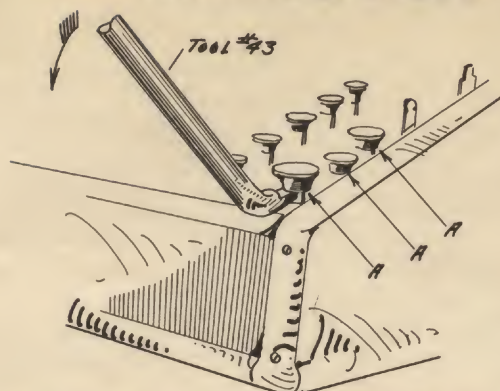
103

REMOVE SCREW 'F' WITH A VERY SMALL  
SCREW DRIVER AND PULL OUT SHIFTING HANDLE.

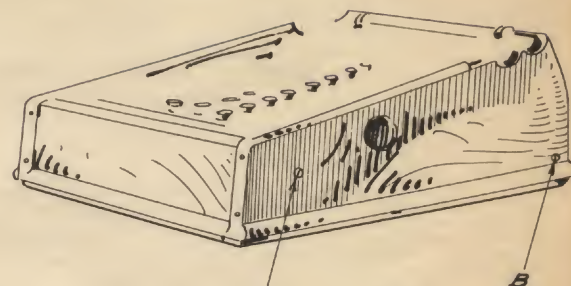
NOTE - DO NOT LET THE SPACING COLLAR FALL OUT.



# DISMANTLING BASE OF MACHINES

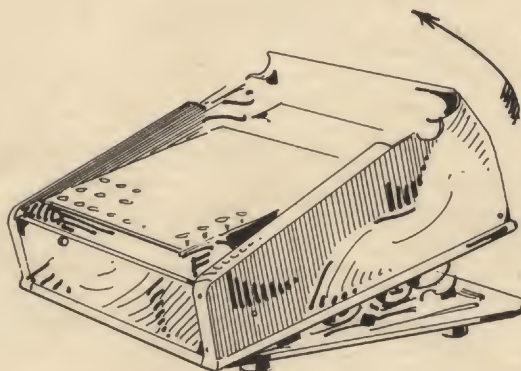


- 104 WITH TOOL #43 PRY OFF THE 'CLEAR' 'REPEAT' AND 'NON REPEAT' BUTTONS OF KEYS 'A' DO IT CAREFULLY AND NOT MAR PLATE



-NOTE-  
THE OTHER SIDE CONTAINS TWO SCREWS IN SAME LOCATION MAKING A TOTAL OF 4 SCREWS TO BE REMOVED.

- 105 REMOVE 4 SCREWS FROM THE SIDE OF THE CASE AS SHOWN ABOVE USE LARGE SCREW DRIVER - DO THE WORK CAREFULLY AND DO NOT DISTURB ANY OTHER SCREWS WHEN DOING THIS OPERATION.



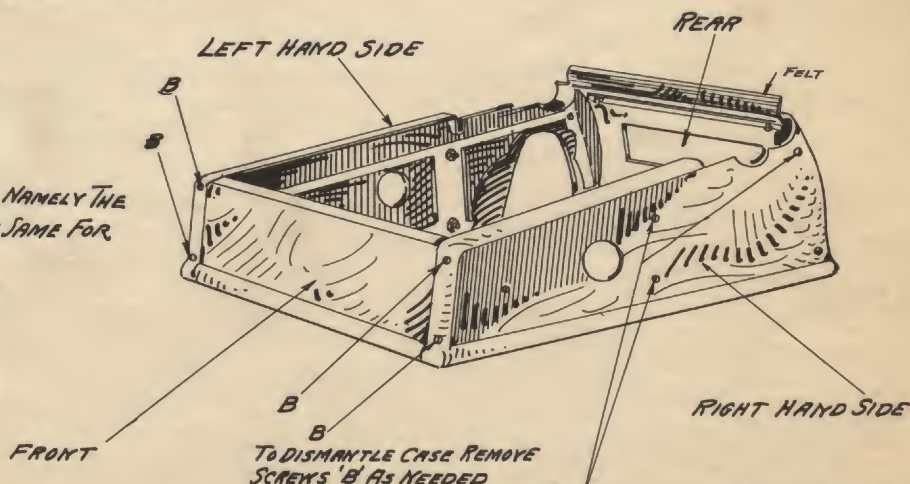
- 106 LIFT REAR END OF CASE UPWARD AND REMOVE FROM BASE OF MACHINE.

SEE ALSO BELOW

## NOTES ON DISMANTLING THE SECTIONAL COVER CASE

THIS CASE CAN BE ENTIRELY DISMANTLED BY REMOVING THE HOLDING SCREWS 'B' (4 IN FRONT PLATE AND 4 IN REAR PLATE)

3 SECTIONS OF THIS COVER CASE - NAMELY THE R.H. SIDE - REAR - FRONT, ARE THE SAME FOR HAND OR AUTOMATIC MACHINES. THE L.H. SIDE DIFFERS HOWEVER

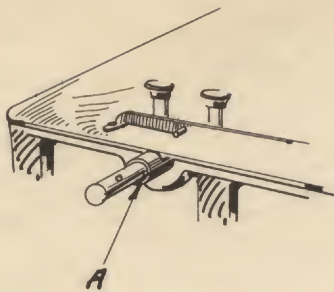


106  
X

NOTE - ANY ONE OF THE FOUR SIDES OF THIS COVER CASE MAY BE REMOVED SEPARATELY FROM THE MACHINE TO GIVE ACCESS TO THE PART OF THE MECHANISM WHICH IT COVERS.

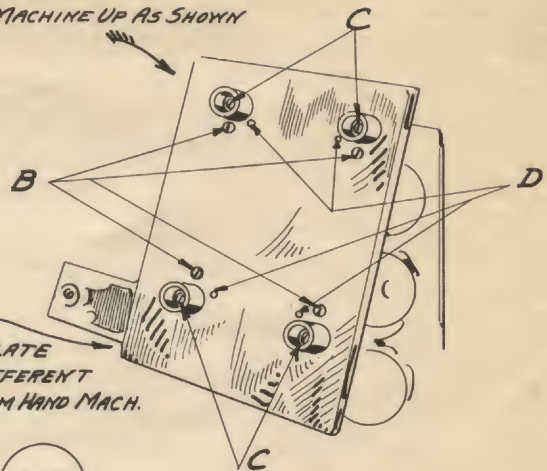


NOTES ON DISMANTLING BASE OF MACHINES.



107 REMOVE COLLAR 'A' AND LAY ASIDE

STAND MACHINE UP AS SHOWN

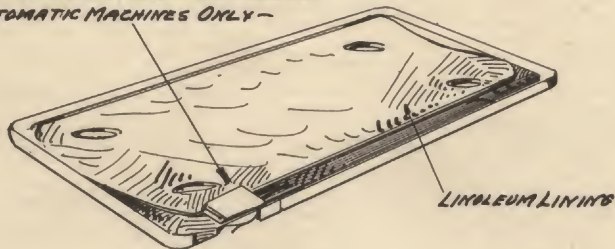


NOTE  
AUTOMATIC MACH. PLATE  
IS SLIGHTLY DIFFERENT  
AT THIS POINT FROM HAND MACH.

108

REMOVE 4 SCREWS 'B' AND 4 RUBBER FEET  
'C' WITH LARGE SCREW DRIVER  
SCREW HOLES 'D' ARE USED FOR SHIPPING PURPOSES.

- NOTE - POSITION OF OIL BLOTTER  
DO NOT LEAVE OUT WHEN ASSEMBLING  
- ON AUTOMATIC MACHINES ONLY -

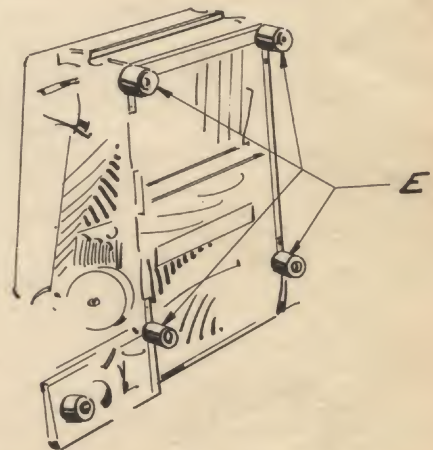


LINOLEUM LINING

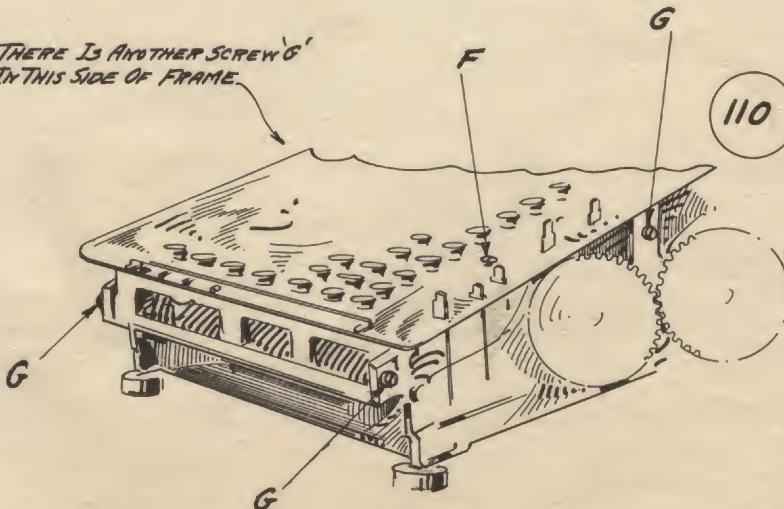
109

REMOVE PAN AND LAY IT ASIDE  
WITH PAD AND SCREWS 'B'

THE RUBBER FEET ARE USED IN  
OPERATION '110'



THERE IS ANOTHER SCREW 'G'  
IN THIS SIDE OF FRAME.



110

IT IS GOOD PRACTICE TO FASTEN THE  
FEET AGAIN UPON THE BASE FRAME - THIS  
GIVES FOOTING AND PREVENTS MUTILATION  
OF BENCH OR DESK: AND MAKES IT EASY  
TO OPERATE THE CRANK.

- TO REMOVE KEY BOARD -

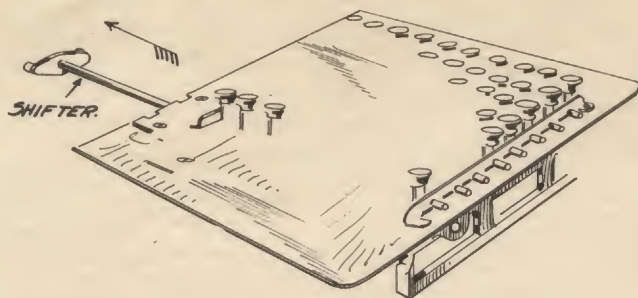
111

REMOVE SCREW 'F' WITH SMALL SCREW  
DRIVER THEN REMOVE 4 SCREWS 'G'  
WITH LARGE SCREW DRIVER AND  
LIFT KEY BOARD OFF BASE OF  
MACHINE.

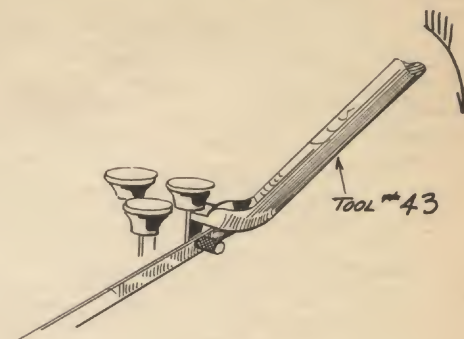


# NOTES ON DISMANTLING THE KEY BOARD.

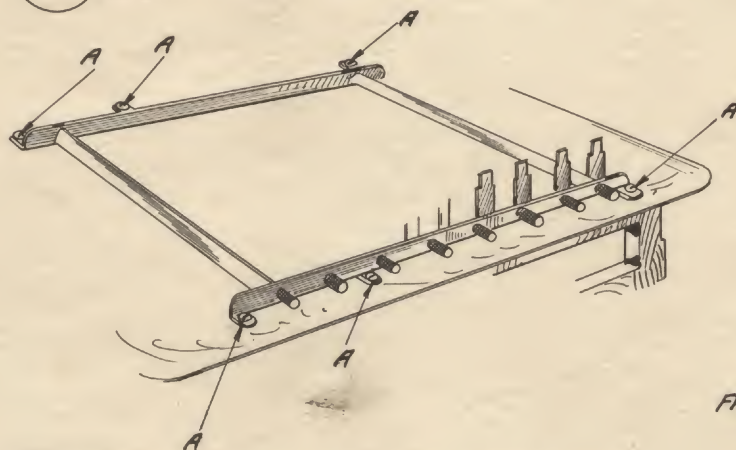
PLATE 17



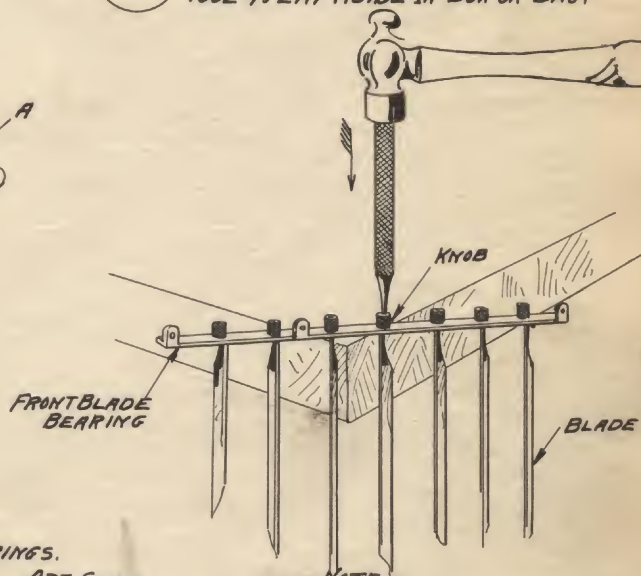
112 REMOVE CARRIAGE SHIFTER.



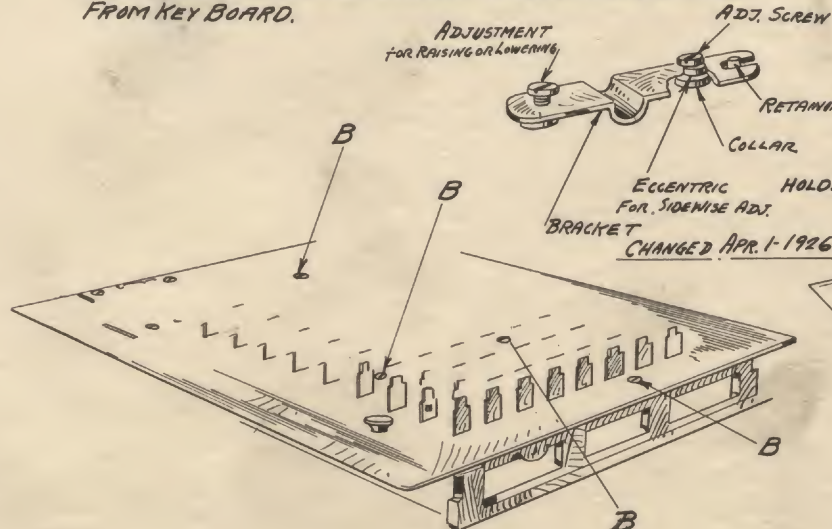
113 REMOVE ALL KEY BUTTONS WITH TOOL #43 LAY ASIDE IN BOX OR BAG.



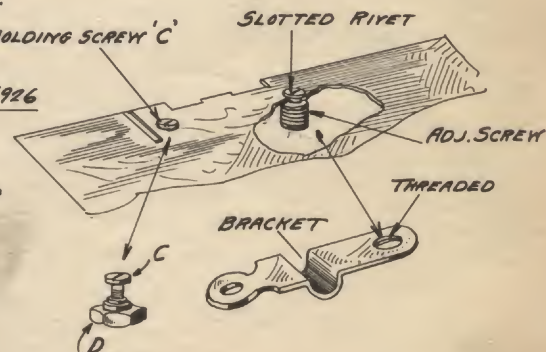
114 REMOVE SIX SCREWS (3 IN EACH BLADE BEARING) CAREFULLY WITH A SMALL SCREW DRIVER. AND REMOVE DECIMAL MARKER BLADES AND BEARINGS. FROM KEY BOARD.



NOTE - BLADES MAY BE DRIVEN OUT OF KNOBS WITH HAMMER AND SMALL PUNCH.



115 REMOVE 4 SCREWS 'B' WITH SMALL SCREW DRIVER CAREFULLY - DO NOT SLIP AND MAR KEY PLATE OR SCREWS. KEY PLATE MAY NOW BE LIFTED OFF.



116 REMOVE SCREW 'C' WITH MED. SCR. DRIVER. DRIVE COLLAR 'D' OUT OF PLATE WITH PUNCH. - UNTHREAD SLOTTED RIVET ENTIRELY FROM BRACKET - REMOVE BRACKET.

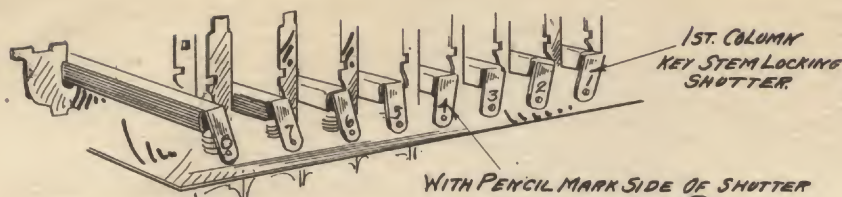
NOTE - SLOTTED RIVET IS HEADED OVER INTO ADJ. SCREW IT MAY BE DRIVEN OUT WITH A PUNCH AS IN OPER. #117







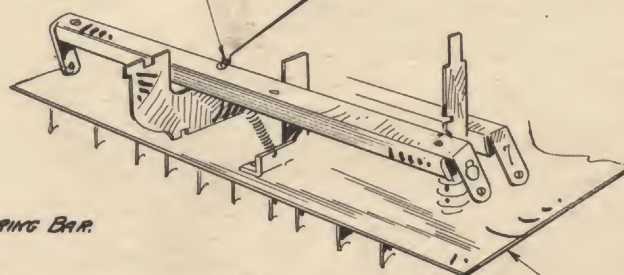
NOTES ON DISMANTLING BODY OF KEY BOARD



122 IT IS GOOD PRACTICE TO MARK SHUTTERS AS SHOWN WITH A PENCIL BEFORE DISMANTLING. SHUTTERS SHOULD BE REASSEMBLED IN SAME LOCATION LATER.

REMOVE CAREFULLY SO AS NOT TO DISTORT LOOP OF SPRING.

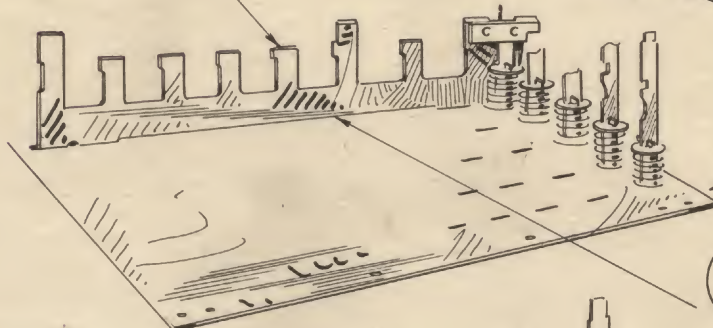
TOOL # 36



123 UNHOOK EACH SPRING FROM THE SHUTTERS AND WITHDRAW SHUTTERS ONE AT A TIME IN ROTATION (BEGINNING WITH "8")

DO NOT REMOVE SPRING FROM ANCHOR STRIP - UNLESS NEW SPRING IS NEEDED

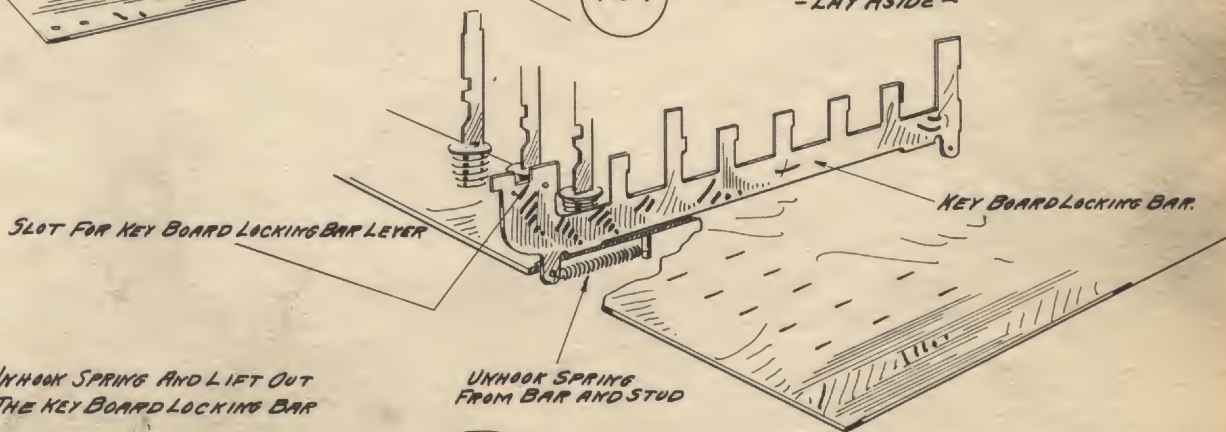
KEY BOARD CLEARING BAR



BOTTOM PLATE

124

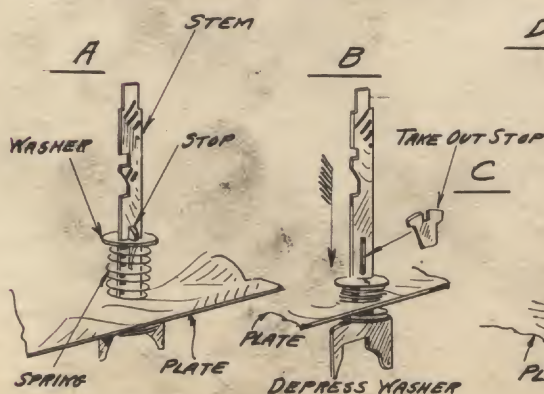
LIFT OUT THIS KEY BOARD CLEARING BAR - LAY ASIDE -



125

UNHOOK SPRING AND LIFT OUT THE KEY BOARD LOCKING BAR

UNHOOK SPRING FROM BAR AND STUD



126

REMOVE KEY STEM AND PARTS - NOTE -

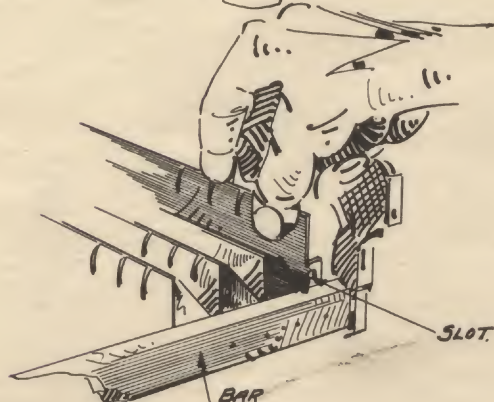
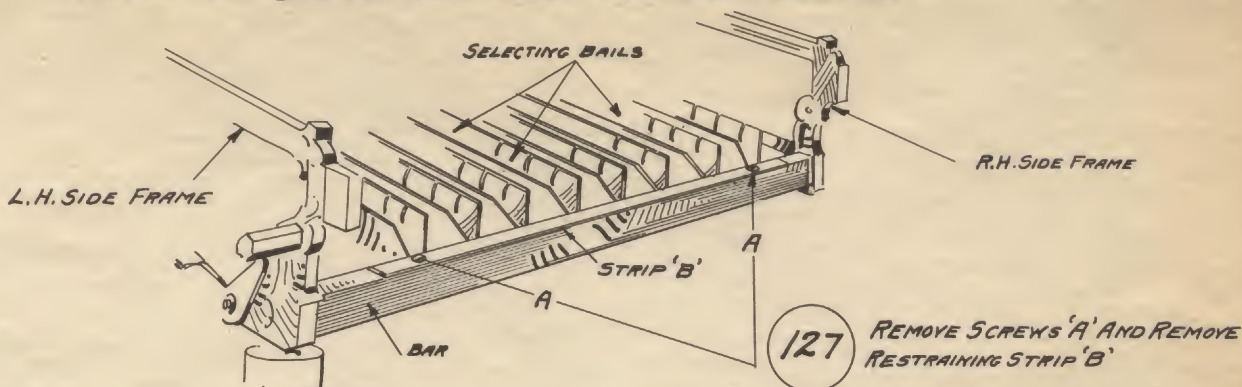
VIEW 'A' SHOWS STEM READY TO DISMANTLE - PRESS DOWN WASHER AS IN 'B' - REMOVE STOP 'C' - TAKE OFF WASHER AND SPRING 'D' - PULL OUT THE STEM AS IN 'E' AND REMOVE FELT AND STEEL WASHER IF NECESSARY

- IMPORTANT -

TAKE OUT ONE ROW AT A TIME AND LAY ASIDE SO THAT EACH KEY AND ITS PARTS MAY BE PLACED IN ITS ORIGINAL LOCATION WHEN ASSEMBLING

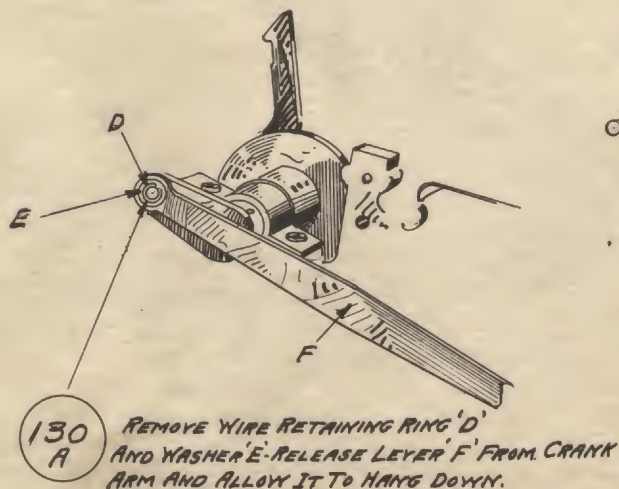


NOTES ON DISMANTLING BASE PARTS OF MACHINES.



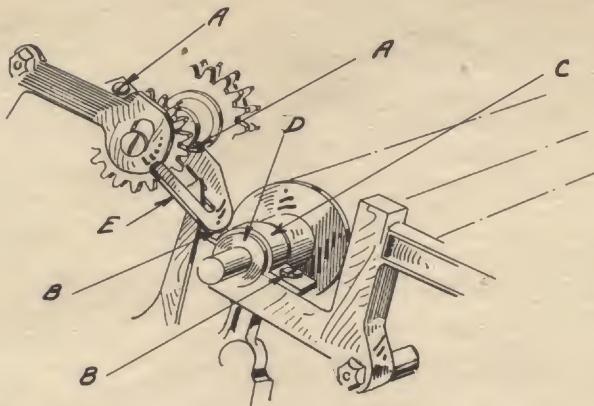
NOTE - THESE PARTS ARE NUMBERED - LAY ASIDE CAREFULLY - DO NOT BEND OR DISTORT WHILE REMOVING OR THEY WILL NOT FUNCTION LATER

NOTES ON DISMANTLING SELECTING GEAR SHAFT.  
— AUTOMATIC MACHINE —





## NOTES ON DISMANTLING THE SELECTING GEAR SHAFT. - HAND MACHINE -



133

REMOVE THE SELECTING GEAR SHAFT.  
THIS MAY BE DONE BY SIMPLY PULLING  
IT OUT-UPWARD.

OPERATION 133 IS THE SAME FOR  
BOTH HAND AND AUTOMATIC MACH.

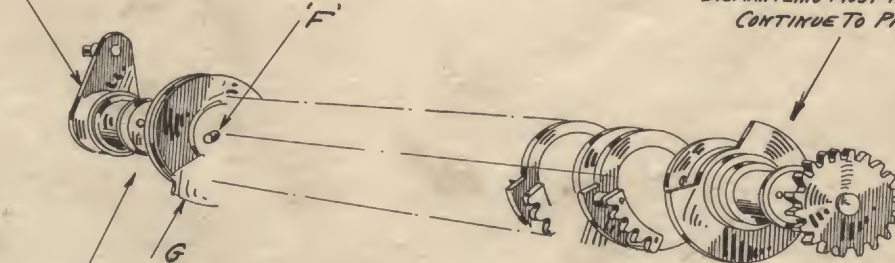
ON HAND MACHINE DO NOT LOSE BUSHING  
AT 'B' (SEE SKETCH "132")

132

ON THE HAND MACHINE BRACKET 'E' MUST BE  
REMOVED BEFORE CAP 'C' CAN BE DISMANTLED.  
REMOVE SCREWS 'A' THEN SCREWS 'B' AND  
LAY ASIDE THE CAPS (BOTH ENDS)

### NOTES ON DISMANTLING THE SHAFT ITSELF.

AUTOMATIC MACHINES HAVE THIS CRANK ARM



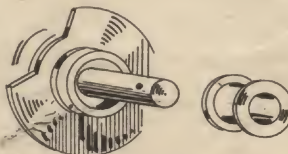
DISMANTLING MUST ALWAYS BEGIN HERE AND  
CONTINUE TO PIN 'F' (LAST SPACING PIN)

DISMANTLING OF LEFT END OF SHAFT  
STOP WITH CAM 'G' AGAINST SHOULDER OF SHAFT



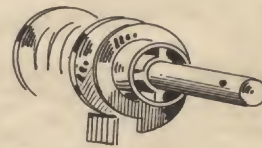
134

DRIVE OUT PIN WITH PROPER PUNCHES  
ON LEAD ANVIL AND REMOVE GEAR  
INSERT PIN IN HUB TO PREVENT LOSS.



135

REMOVE BUSHING (R.H.)



136

REMOVE R.H. CARRIAGE LOCK CAM



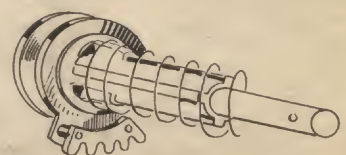
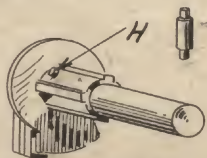
137

REMOVE DRIVING CAM  
FOR R.H. LOCK CAM.



138

REMOVE SPACING PIN  
WITH PROPER PUNCHES  
AND LEAD ANVIL



139

REMOVE THE 4 TOOTH  
SELECTING GEAR





SUPPLEMENTARY BULLETIN # 34-A  
PLATE 22 - OPERATION 142

DATE: June 15, 1926

TO ALL OFFICES:

A change has been made in the sequence of the Selecting Gears in order to standardize the Selecting Gear Shaft common to all Models.

For this reason the gears are now numbered as follows:

Twelve Place - Right to left - 2-3-5-6-10-8

Sixteen Place       "       "       "       - 2-3-4-5-6-7-10-9

Twenty Place       "       "       "       - 1-2-3-4-5-6-7-8-10-9

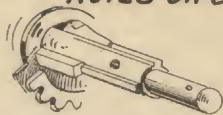
We request that this Bulletin be filed opposite and facing Plate 22 of Machine Service Bulletin #34. It will be noted that a suitable margin has been left on the right hand side of this Bulletin for that purpose. Filed in this manner, it will furnish our servicemen with complete information when referring to Operation #142.

FMS:MEW

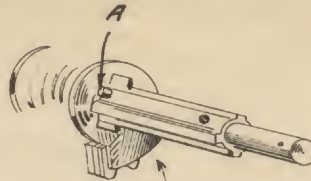
*J. M. Smith*  
General Service Manager



## NOTES ON DISMANTLING SELECTING GEAR SHAFT ITSELF



140 REMOVE SPRING



141 REMOVE THE 5 TOOTH SELECTING GEARS.



142 REMOVE PIN 'A' AND SUBSEQUENT PARTS- SELECTING GEARS ARE NUMBERED FROM 2 TO 9 THESE MUST BE NOTED AND REASSEMBLED IN THE SAME ORDER LATER- PROCEED TO DISMANTLE PARTS UNTIL THE LAST SPACING PIN IS REACHED.

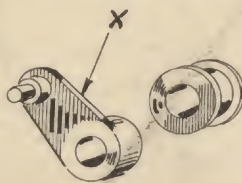
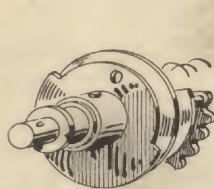
### IMPORTANT

IN 12 PLACE MACHINE SELECTING GEAR COMBINATION IS 2-3-5-6-7-8

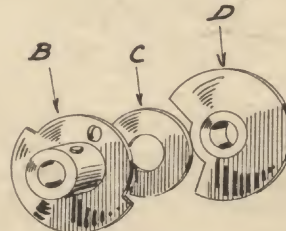
" 16 " " " " " " 2-3-4-5-6-7-8-9

" 20 " " " " " " 1-2-3-4-5-6-7-8-9-10

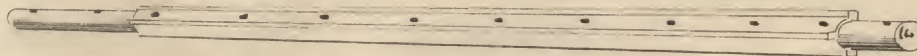
### DISMANTLING L.H. END.



143 A DRIVE OUT PIN WITH PROPER PUNCHES ON LEAD ANVIL AND REMOVE CRANK ARM AND L.H. BUSHING (INSERT PIN IN HUB OF CRANK ARM TO PREVENT LOSS) (PART 'X' WILL BE FOUND ON AUTOMATIC MACH. ONLY)

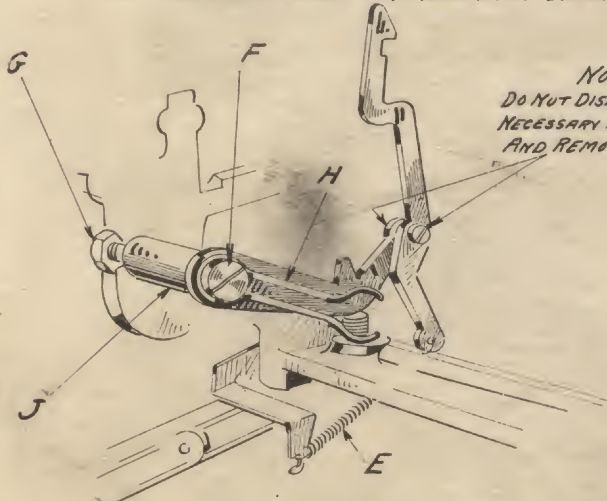


144 DRIVE OUT PIN WITH PROPER PUNCHES ON LEAD ANVIL- REMOVE KEY LOCK CAM 'B'- WASHER 'C' AND L.H. LOCK CAM 'D'



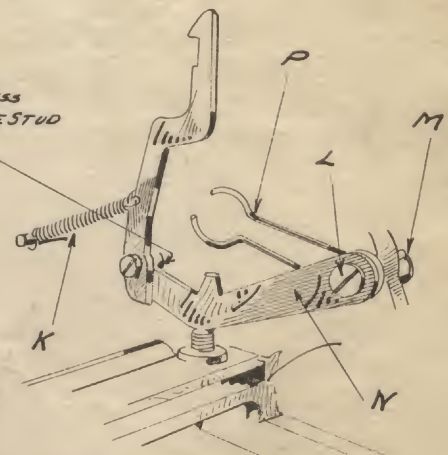
SELECTING GEAR SHAFT HAS NOW BEEN STRIPPED

### DISMANTLING R.H. AND L.H. CARRIAGE LOCKS.



NOTE  
DO NOT DISMANTLE FURTHER UNLESS NECESSARY IF NECESSARY FILE THE STUD AND REMOVE WITH PUNCH

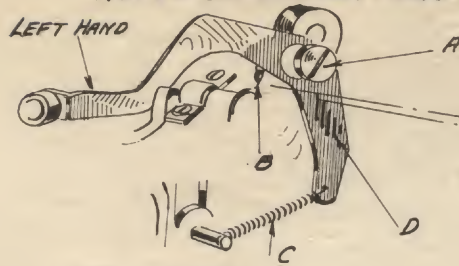
145 UNHOOK SPRING 'E'- HOLD SCREW 'F' WITH LARGE SCREW DRIVER AND WITH A  $\frac{5}{16}$  WRENCH LOOSEN NUT 'G' REMOVE STUD 'F' WITH 'J' AND 'H' WITHDRAW FROM MACHINE LAY ASIDE BRAKE 'H' AND INSERT STUD AND NUT TO PREVENT LOSS.



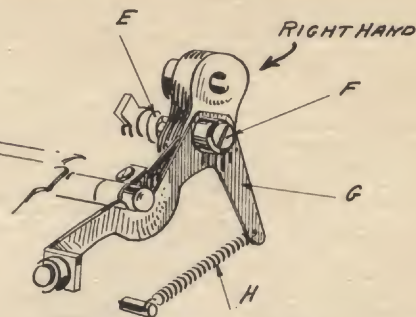
146 UNHOOK SPRING 'K'- HOLD SCREW 'L' WITH LARGE SCREW DRIVER AND WITH A  $\frac{5}{16}$  WRENCH LOOSEN NUT 'M'- REMOVE PIVOT STUD 'L' AND PARTS 'K' AND 'P' LAY ASIDE THE BRAKE 'P' INSERT STUD AND NUT TO PREVENT LOSS.



## NOTES ON DISMANTLING THE L. H AND R.H. CARRIAGE SUPPORT ARM UNITS.



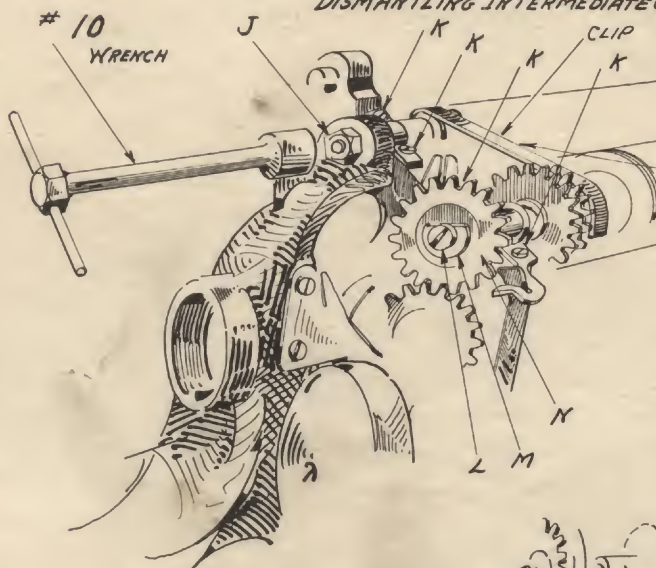
- 147 UNHOOK SPRING 'C'  
UNSCREW 'A'-HOLDING NUT 'B'  
REMOVE UNIT 'D' AND LAY ASIDE  
INSERT NUT AND STUD TO PREVENT LOSS.



- 148 UNHOOK SPRING 'H'-UNSCREW 'F' WHILE  
HOLDING NUT 'E'-REMOVE UNIT 'G' INSERT  
NUT AND STUD TO PREVENT LOSS.

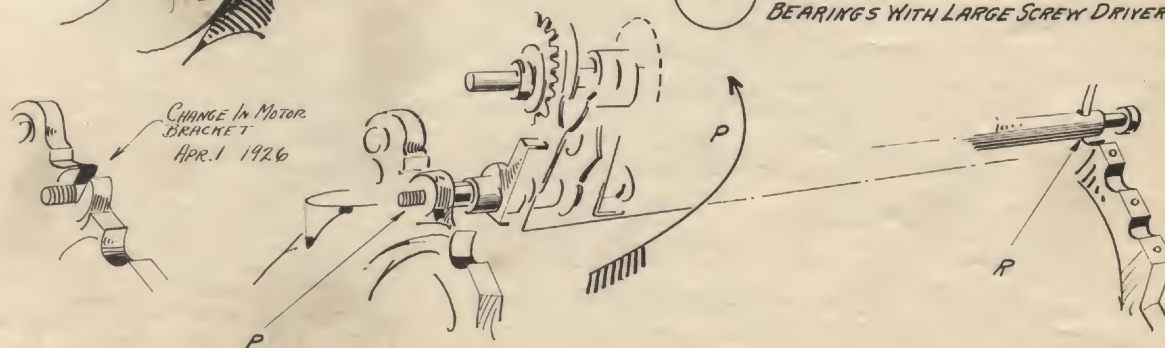
DO NOT DISMANTLE UNITS FURTHER UNLESS NECESSARY

### DISMANTLING INTERMEDIATE GEAR SHAFT

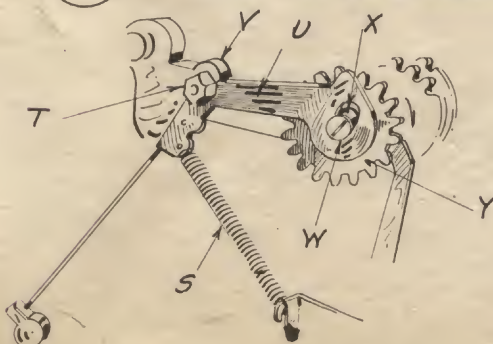


- 149 A A CLIP #47 MAY BE INSERTED  
HERE TO HOLD THESE TWO SHAFTS FROM  
SPRINGING OUT WHEN SHAFTS ARE TO BE REMOVED  
WITH WRENCH #10 LOOSEN NUT 'J' AND REMOVE IT  
TAKE OFF SCREW 'L' WITH WASHER 'M' AND GEAR 'N'  
AND LAY THESE PARTS ASIDE.

- 150 REMOVE SCREWS 'K' AND TAKE OFF CAPS FOR  
BEARINGS WITH LARGE SCREW DRIVER



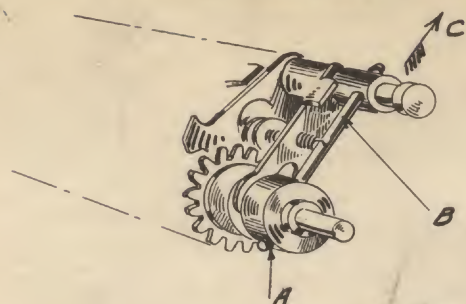
- 151 A IN THE AUTOMATIC MACHINE-SWING SHAFT UPWARD AS SHOWN BY ARROW-LIFT END 'R' SLIGHTLY AND  
SHAFT MAY BE WITHDRAWN FROM 'Q' BY VIBRATING IT OUTWARD



- 152 - HAND MACHINE -  
UNHOOK SPRINGS-LOOSEN NUT 'T' WITH WRENCH SHOWN IN #149A  
REMOVE 'U' (INCLUDING 'Y') NEXT TAKE OFF SCREW 'W'  
WASHER 'X' AND GEAR 'Y'
- 153 REMOVE SCREWS AND CAPS  
AS IN VIEW #150
- 154 LIFT INTERMEDIATE SHAFT OUT OF MACHINE.



DISMANTLING THE INTERMEDIATE GEAR SHAFT ITSELF



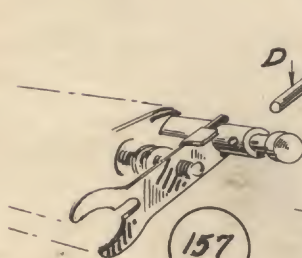
155

HOLDING CLIP #47 SHOULD NOW BE REMOVED  
REMOVE RETAINING RING 'A' AND PUSH POSITIONING PIN 'B' THROUGH IN DIRECTION OF ARROW 'C' BUT ALLOW IT TO STILL HOLD THE CHECK SPRING.

156

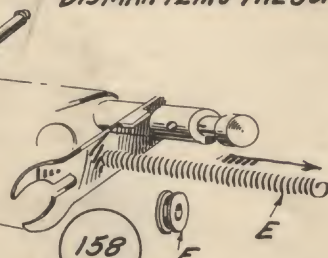
SEPARATE THE SHAFTS.

DISMANTLING THE SUPPORT ROD FOR CARRYING WEDGE AND CHECK MECHANISM.



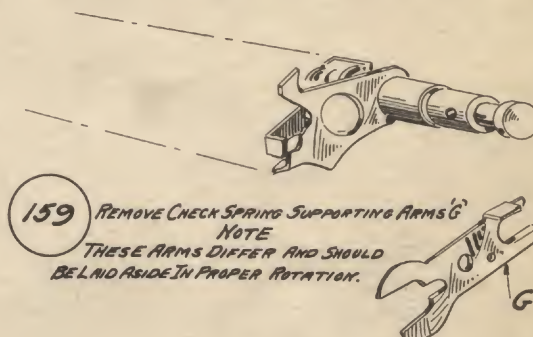
157

UNHOOK SPRING AND WITHDRAW THE POSITIONING PIN 'D'



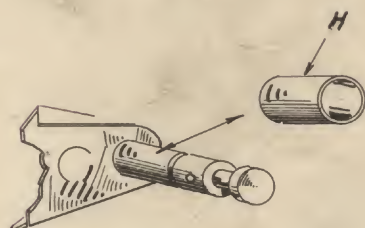
158

PULL OUT SPRING 'E' AND GATHER CHECK SPRING ROLLERS 'F'



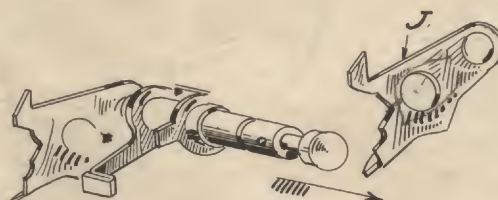
159

REMOVE CHECK SPRING SUPPORTING ARMS 'G'  
NOTE THESE ARMS DIFFER AND SHOULD BE LAID ASIDE IN PROPER ROTATION.



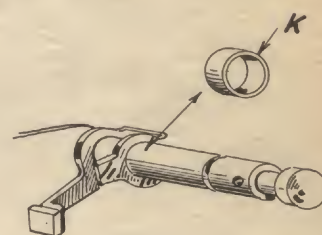
160

SLIP OFF SPACING COLLAR 'H'



161

SLIP OFF THE CARRYING WEDGE 'J'



162

SLIP OFF THE SPACING COLLAR 'K'



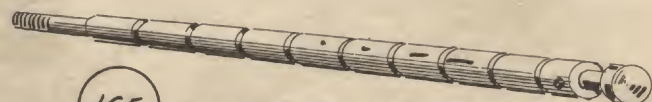
163

SLIP OFF THE CARRYING CHECK PAWL 'L'



164

SLIP OFF THE FRICTION SPRING 'M'



165

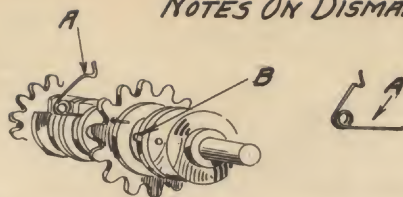
STRIP THE SHAFT ENTIRELY IF NECESSARY

IMPORTANT NOTE

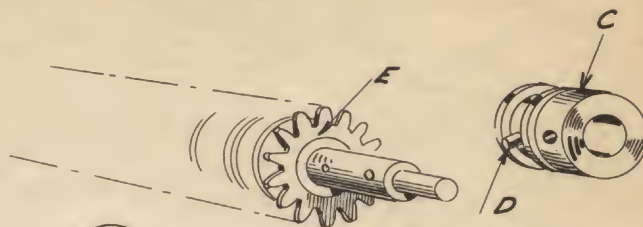
IT IS GOOD PRACTICE TO LAY ASIDE THESE PARTS AS DISMANTLED SO THAT THEY CAN BE REASSEMBLED AS BEFORE.



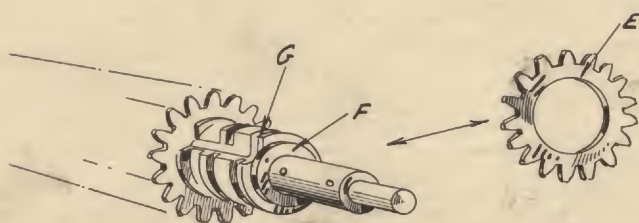
## NOTES ON DISMANTLING THE INTERMEDIATE GEAR SHAFT



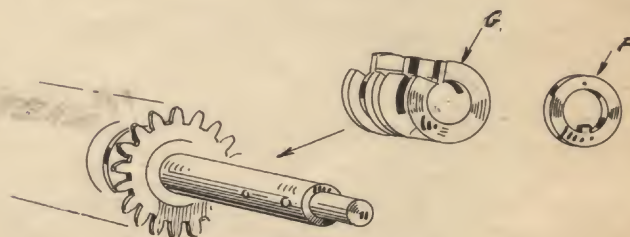
- 166 REMOVE THE WEDGE SPRINGS 'A' AND DRIVE OUT PIN 'B' WITH PROPER PUNCHES ON A LEAD ANVIL



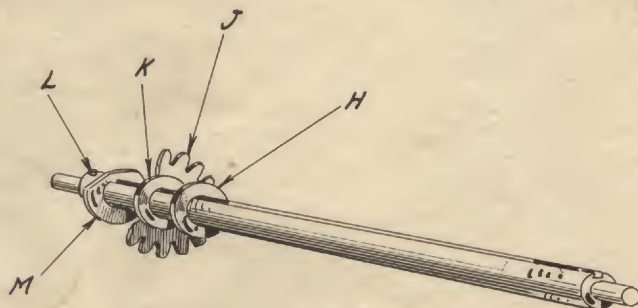
- 167 REMOVE R.H. COLLAR 'C' AND INSERT PIN 'D' TO PREVENT LOSS.



- 168 REMOVE INTERMEDIATE GEAR 'E'



- 169 REMOVE BEARING 'F' AND GEAR COLLAR 'G' AND SO FORTH UNTIL 'H' IS REACHED



- 170 REMOVE SPACING COLLAR 'H' GEAR 'J' AND BEARING 'K'

### NOTES

DO NOT DISSASSEMBLE 'L'-M EXCEPT IN CASE OF REPLACEMENT.

DO NOT DISMANTLE SHAFT FROM L.H. END ALWAYS FROM RIGHT END

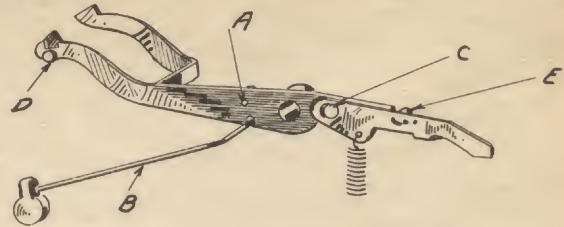
TAKE NOTE OF POSITION OF PARTS LAY THEM ASIDE IN ROTATION TO INSURE PROPER REASSEMBLING.



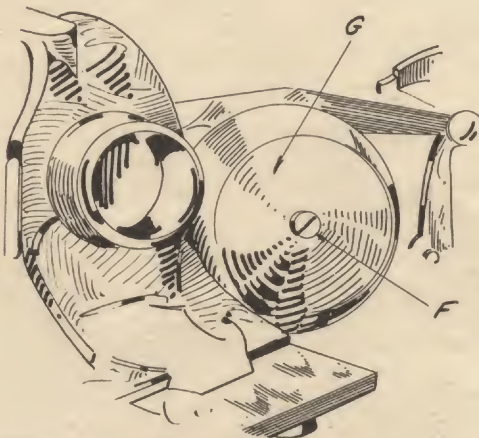
## TO DISMANTLE THE AUTOMATIC PARTS ON THE LEFT HAND SIDE FRAME AND MOTOR BRACKET

NOTE-OPERATION 129A PLATE 20 HAS PREVIOUSLY REMOVED THE OVERCARRY TRIP LEVER FROM MACHINE SO CLUTCH GEAR SHAFT MAY BE TAKEN OUT.

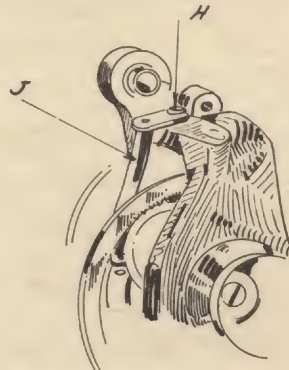
IF NECESSARY THIS TRIP LEVER MAY BE FURTHER DISMANTLED AS FOLLOWS.



- 175 A FILE RIVET AT 'A' AND WITH PROPER PUNCH EXTRACT RIVET AND REMOVE 'B' PARTS 'C-D-E' ARE NOT REMOVED UNLESS ABSOLUTELY NECESSARY.



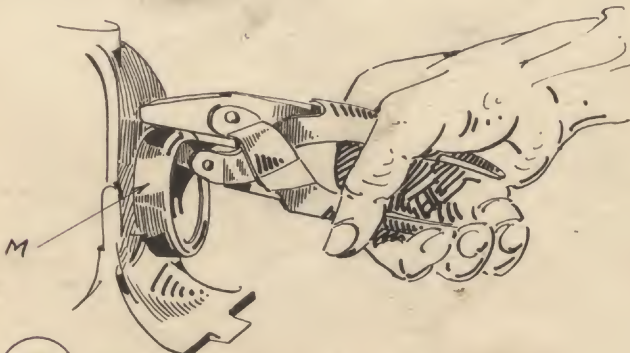
- 176 A REMOVE SCREW 'F' AND TAKE OFF BELL 'G'



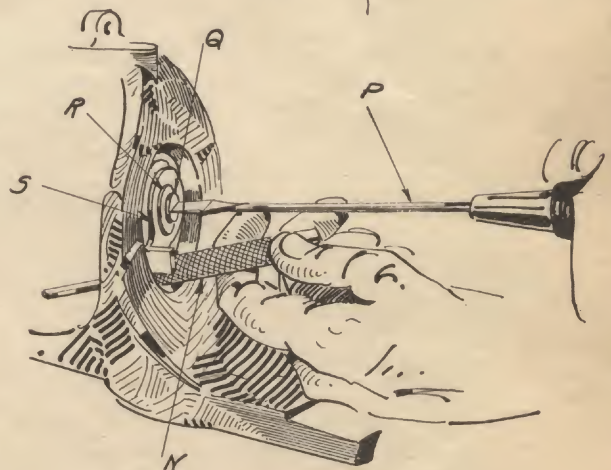
- 177 A REMOVE SCREW 'H' AND TAKE OFF OIL TUBE AND BRACKET 'J'



- 178 A REMOVE SCREWS 'K' AND TAKE OFF GUIDE 'L'



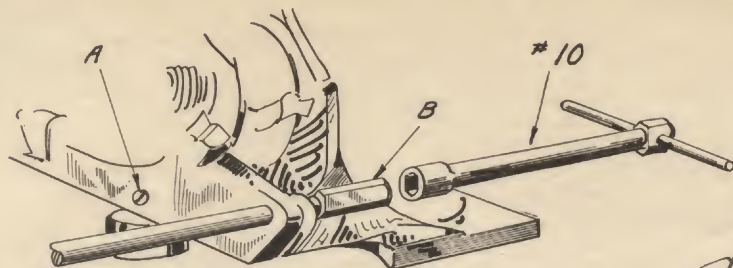
- 179 A WITH PLIERS THE OIL SHIELD MAY BE TAKEN OUT.



- 180 A USE WEDGE 'N' TO HOLD ARM 'S'-REMOVE SCREW 'Q' WITH LARGE SCREW DRIVER 'P' REMOVE WASHER 'R' AND MACHINE DRIVING ARM 'S'

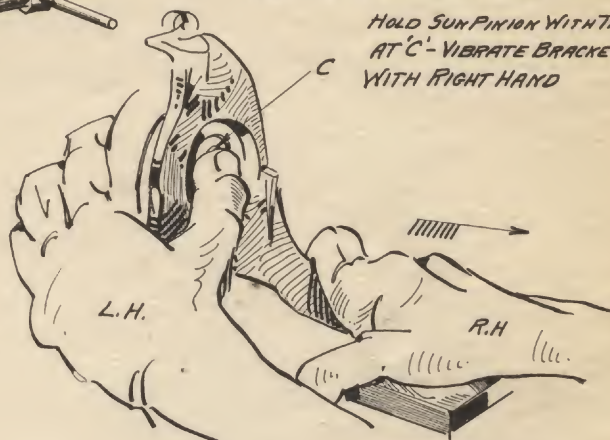


## DISMANTLING THE AUTOMATIC PARTS ON THE L.H. SIDE FRAME AND MOTOR BRACKET

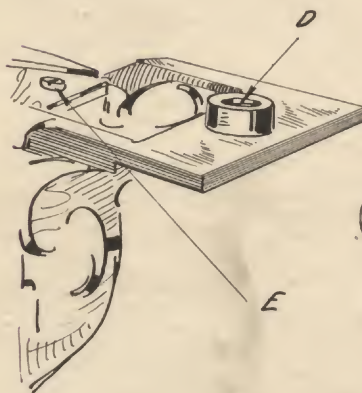


181  
A REMOVE SCREW 'A' WITH LARGE SCREW DRIVER  
AND NUT 'B' WITH #10 WRENCH.

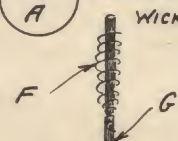
182  
A REMOVE BRACKET WITHOUT  
PULLING OFF TRANSMISSION UNIT.  
HOLD SUN PINION WITH THUMB  
AT 'C' - VIBRATE BRACKET OFF  
WITH RIGHT HAND



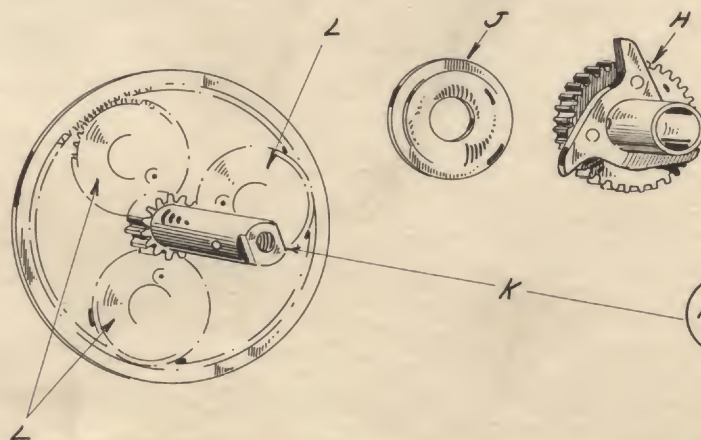
183  
A REMOVE RUBBER FOOT



184  
A REMOVE SCREW 'E' WITH LARGE SCREW DRIVER  
WICK AND WITH TWEEZERS PULL OUT SPRING 'F' AND WICK 'G'



## DISMANTLING THE TRANSMISSION UNIT



185  
A REMOVE SUBTRACTION SUN GEAR 'H'  
AND WASHER 'J'

186  
A REMOVE THE SUN PINION 'K'

187  
A REMOVE THE PLANET PINIONS 'L'

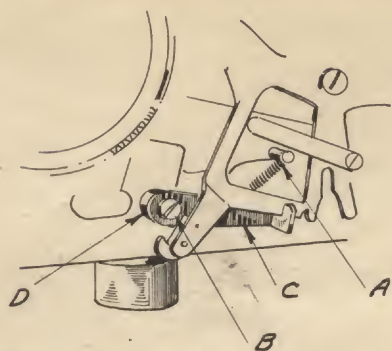


- NOTE -

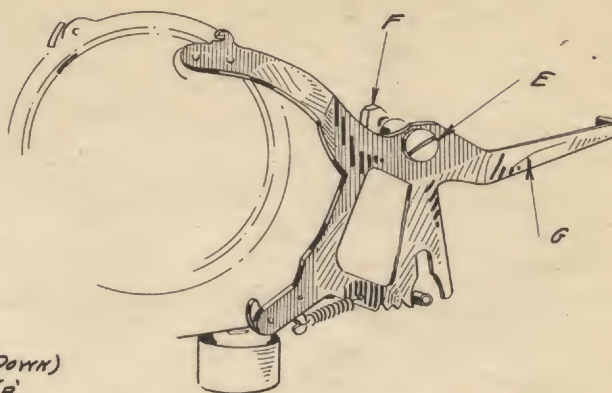
ON THE AUTOMATIC MACHINE IN ORDER TO  
EXTRACT THE MAIN CARRYING SHAFT THE  
FOLLOWING OPERATIONS MUST BE PERFORMED  
\*177A- 178-A-180A SHOWN ON PLATE 26  
181A-182A-185A-186A-187A SHOWN ABOVE



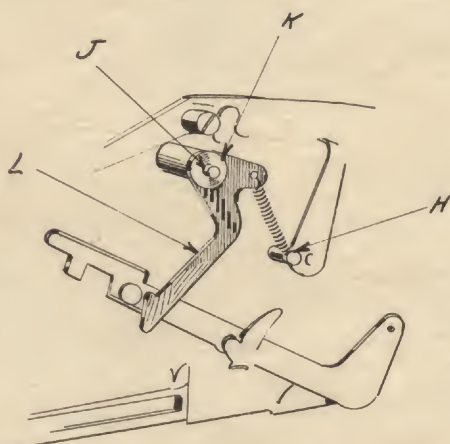
## DISMANTLING THE AUTOMATIC PARTS ON THE L.H. SIDE FRAME.



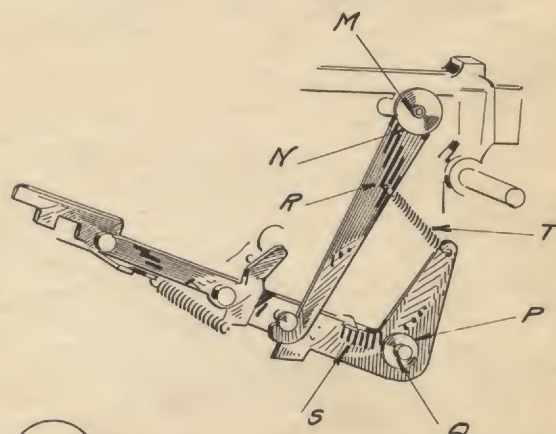
- 188  
A UNHOOK SPRING AT 'A' (PART 'C' WILL DROP DOWN)  
WITH LARGE SCREW DRIVER TAKE OUT SCREW 'B'  
REMOVE UNIT 'C' WITH COLLAR 'D'



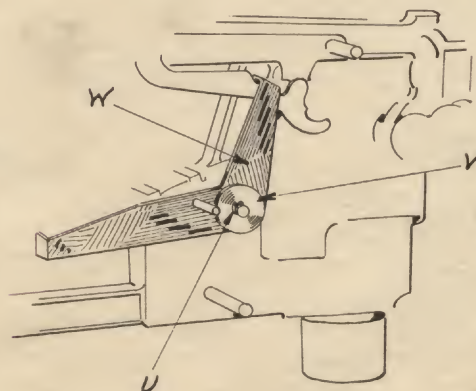
- 189  
A REMOVE SCREW 'E' AND NUT 'F' AND TAKE OFF  
CLUTCH YOKE 'G'  
INSERT SCREW AND NUT TO PREVENT LOSS



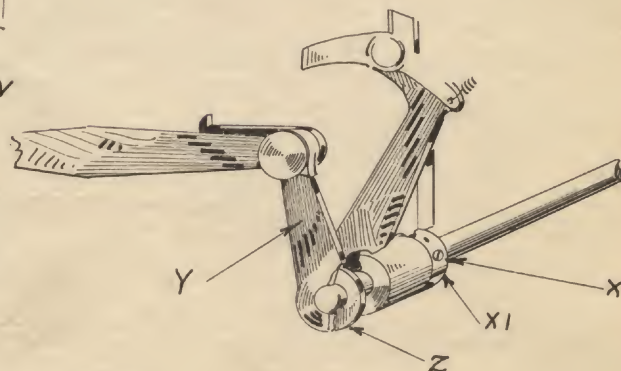
- 190  
A UNHOOK SPRING AT 'H' - REMOVE RETAINING  
RING 'J' - WITHDRAW WASHER 'K' AND LATCH 'L'



- 191  
A REMOVE RETAINING RINGS 'M' AND 'Q' - REMOVE WASHERS  
'N' AND 'P' - WITHDRAW 'R' FROM STUD - WITHDRAW ENTIRE  
'S' AND 'R' (PARTS MAY BE SEPARATED BY UNHOOKING  
SPRING 'T'.



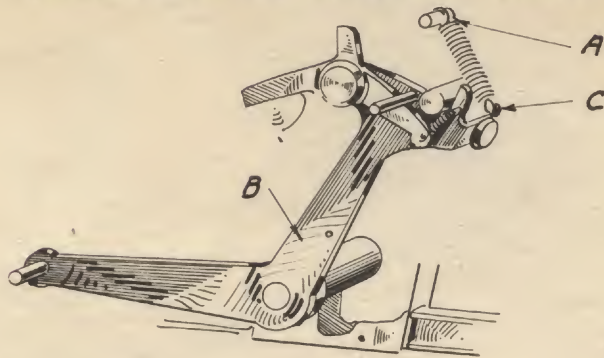
- 192  
A REMOVE RETAINING RING 'U' AND WASHER 'Y'  
TAKE OFF THE QUICK STROKE LATCH 'W'



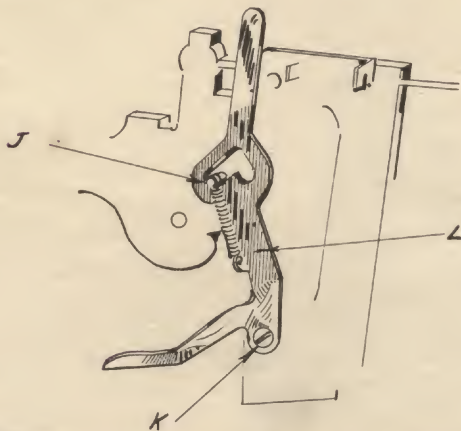
- 193  
A LOOSEN SCREW 'X' IN LOCKING COLLAR 'XI' INSIDE OF FRAME  
PULL OUT THE ROCK LEVER 'Y' WITH SHAFT SEE THAT  
WASHER 'Z' IS ON SHAFT ('XI' WILL FALL OFF SHAFT  
AND SHOULD BE FOUND AND PUT ASIDE)



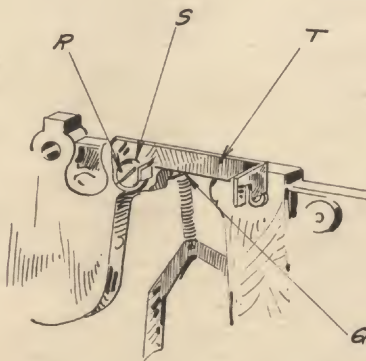
## DISMANTLING THE AUTOMATIC PARTS ON THE L.H. SIDE FRAME



194  
A UNHOOK SPRING 'A' AND CYCLE STOPPING ARM 'B' MAY BE PULLED OUT OF FRAME

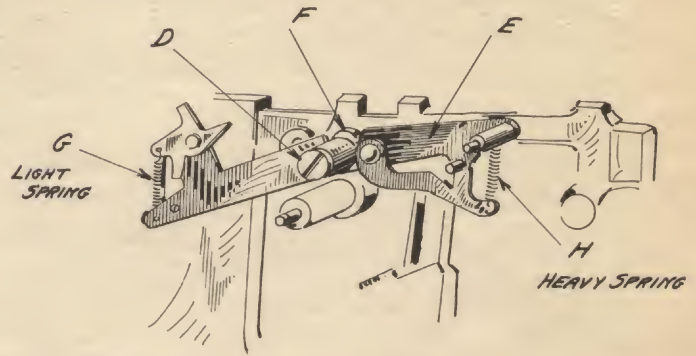


197  
A UNHOOK SPRING AT 'J' REMOVE SCREW 'K' TAKE OFF BELL LEVER 'L'

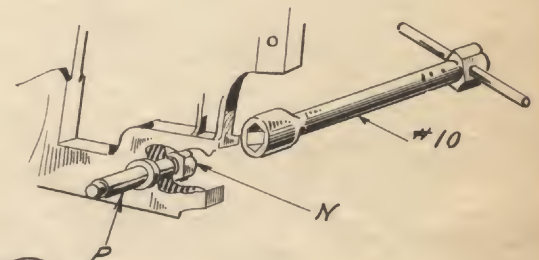


199  
A UNHOOK SPRING AT 'Q' - REMOVE SCREW 'R' WITH WASHER 'S' TAKE OFF GUIDE BLANK 'T'

195  
A WHEN PART IN OPER #194A HAS BEEN REMOVED UNHOOK SPRING AT 'C' AND LAY ASIDE



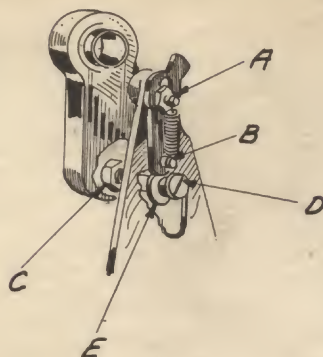
196  
A REMOVE PIVOT STUD 'D' TAKE OFF STOPPING LEVER 'E' LAY ASIDE THE SPACING WASHER 'F'



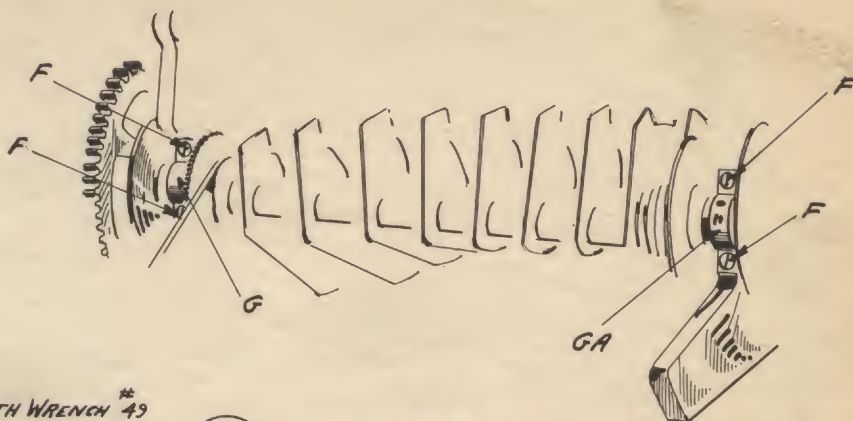
198  
A TAKE OFF NUT 'N' WITH WRENCH AND REMOVE PIVOT STUD 'P'



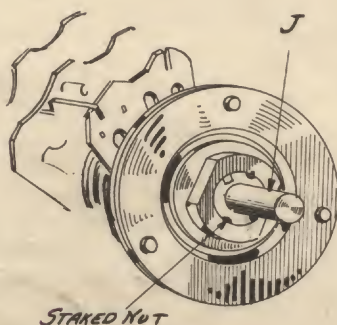
## REMOVING AND DISMANTLING THE CARRYING SHAFT, (KÖANDKA'OMACHINE)



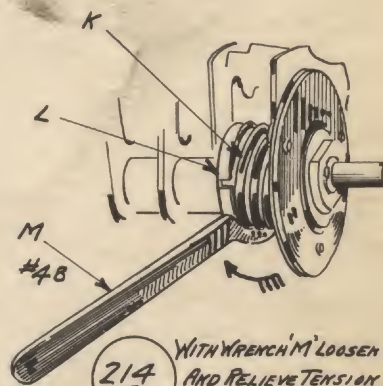
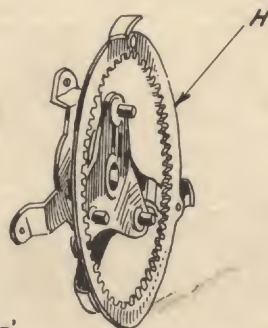
- 210 REMOVE SPRING AT 'A'— AND WITH WRENCH #49 REMOVE NUT 'C' WHILE HOLDING 'D' WITH LARGE SCREW DRIVER PULL OUT STUD 'D' AND LAY ASIDE THE SPACING COLLAR 'E'



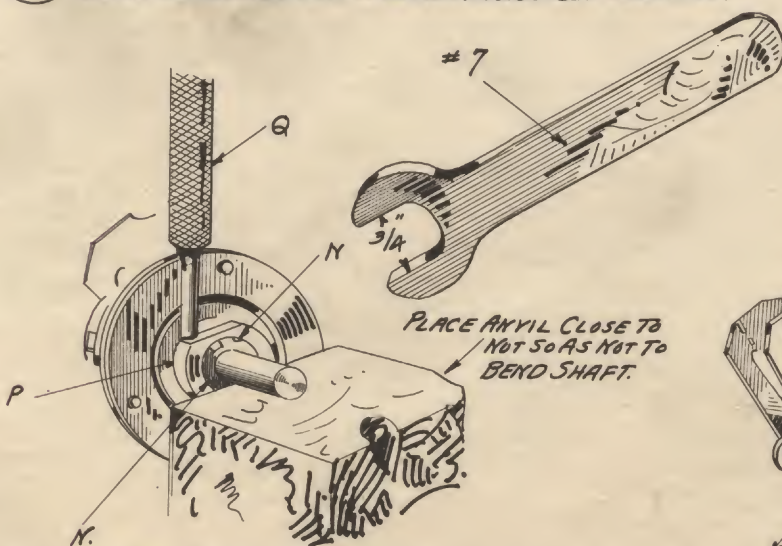
- 211 REMOVE SCREWS 'F' AND BEARING CAPS 'G' AND 'GA'
- 212 REMOVE THE ENTIRE CARRYING SHAFT—NOTE—IF IT COMES OUT HARD TAP IT SLIGHTLY WITH HAMMER HANDLE FROM THE REAR OF THE SHAFT, INSIDE OF FRAME



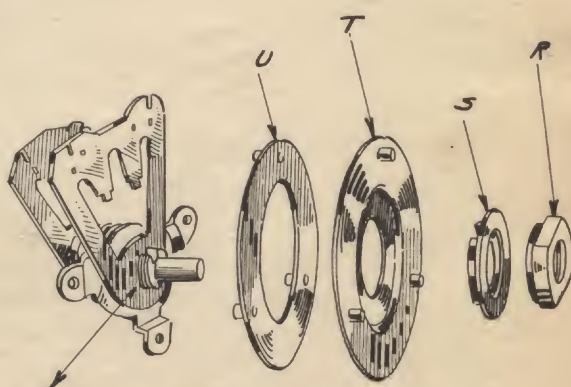
- 213 A REMOVE PLANET GEAR 'H' FROM SHAFT 'J' DO NOT DISMANTLE UNIT 'H' UNLESS ABSOLUTELY NECESSARY



- 214 A WITH WRENCH 'M' LOOSEN NUT 'L' AND RELIEVE TENSION OF SPRING 'K' AS MUCH AS POSSIBLE



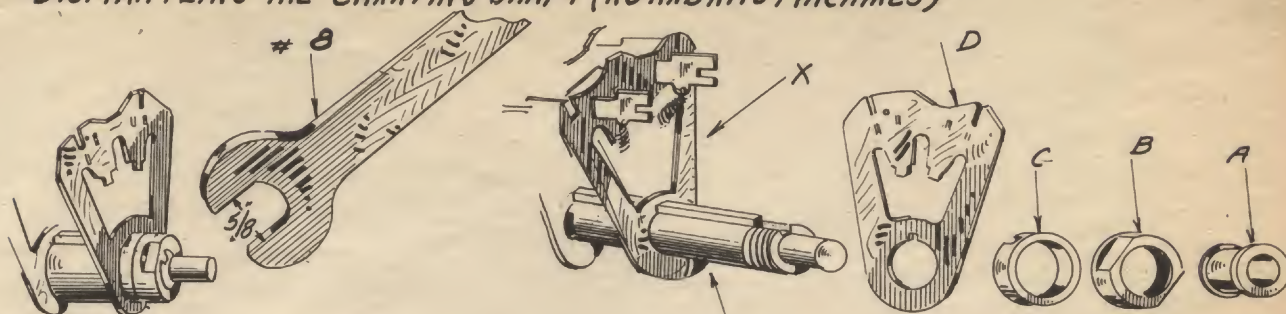
- 215 A NUT 'P' IS STAKED ON AT 'N' TO RELEASE THIS NUT A VICE IS ADVISABLE IN THE ABSENCE OF A VICE A LARGE SIZE PUNCH 'Q' MAY BE USED WITH LEAD ANVIL TO START NUT THEN USE WRENCH #7



- 216 A REMOVE NUT 'R' AND SPACING COLLAR'S FRICTION DISC DRIVER AND FRICTION DISC DRIVER 'U' IN SEQUENCE AND LAY ASIDE



# PLATE 31 DISMANTLING THE CARRYING SHAFT (K'0 AND K'A'0 MACHINES)

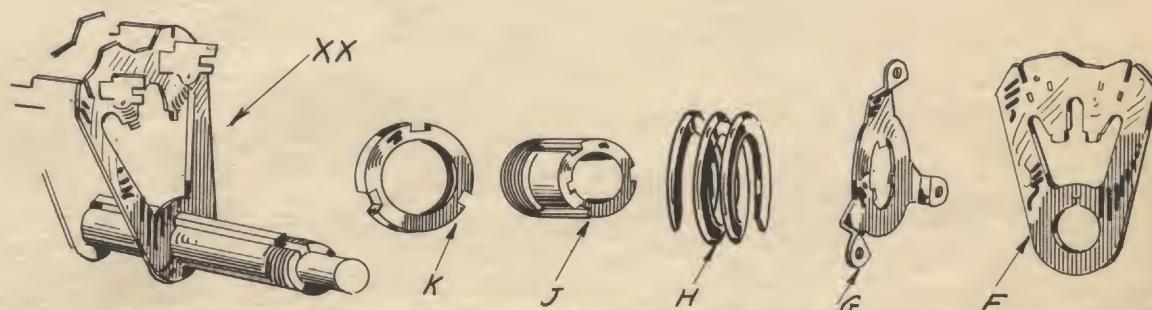


217 SEE OPER. #215A AND USE PUNCH AS SHOWN THEN WRENCH NO. 8 TO TAKE OFF NUT.

- NOTE -

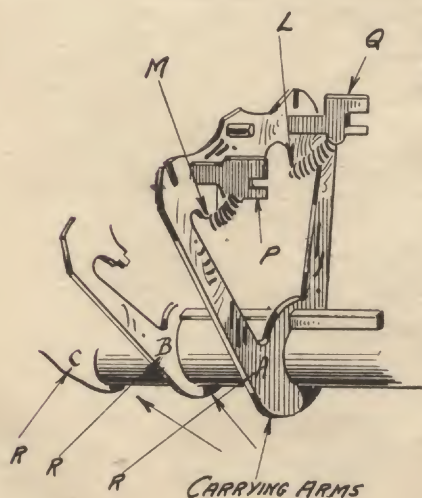
THE ABOVE APPLIES TO THE HAND MACH. ONLY.

218 REMOVE BUSHING 'A' - NUT 'B' SPACING COLLAR 'C' - LAST CARRYING ARM 'D' AND SPACING COLLAR 'E' IN SEQUENCE AND LAY ASIDE



THE ABOVE APPLIES TO THE AUTOMATIC MACH. ONLY

219 A REMOVE LAST CARRYING ARM 'F' - DRIVING SPIDER 'G' - DISC. SPRING 'H' - SPACING COLLAR 'J' AND NUT 'K' IN SEQUENCE AND LAY ASIDE - NOTE - THE REST OF THE SHAFT 'XX' IS NOW SIMILAR TO 'X' OF THE HAND MACHINE UNTIL LAST ARM IS DISMANTLED



220 UNHOOK SPRING AT 'L' AND 'M' AND PARTS 'Q' AND 'P' MAY BE TAKEN OFF. - NOTE - THESE DOGS VARY FROM EACH OTHER AS SHOWN BELOW.

ADDITION CARRYING DOG



SUBTRACTION CARRYING DOG



221 IT IS GOOD PRACTICE TO MARK AS AT 'R' THE CARRYING ARMS BEFORE DISMANTLING TO AID YOU LATER IN PUTTING THEM IN PROPER RELATION.

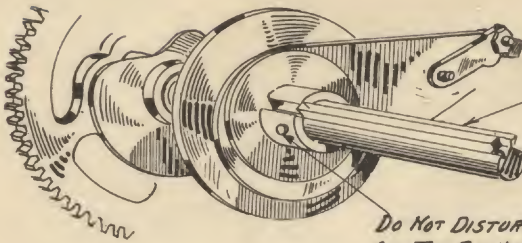
222 REMOVE CARRYING ARMS IN SEQUENCE - TAKE OFF DOGS AS THEY ARE MADE ACCESSIBLE REMOVE SPACING COLLARS AS YOU GET TO THEM AND STRIP SHAFT

- IMPORTANT NOTE -

IF A REPLACEMENT OF A CARRYING ARM IS NECESSARY DETERMINE WHICH COLUMN IS SERVED - WHEN REQUISITIONING MATERIAL STATE THE COLUMN AND MODEL OF MACHINE (THE SAME COLUMN ON THE VARIOUS MODELS DOES NOT ALWAYS USE THE SAME CARRYING ARM.)



## DISMANTLING THE CARRYING SHAFT.



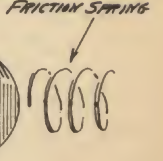
NOTE-

WHEN THE LAST CARRYING ARM AND ITS UNITS ARE REMOVED THE AUTOMATIC MACH SHAFT LOOKS LIKE ABOVE

CHECK PAWL OPERATING ARM



FRICTION WASHER

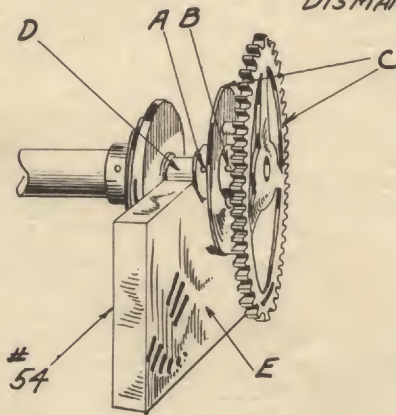


Do Not Disturb This Unit By Driving Out This Pin Unless Absolutely Necessary

HOWEVER-

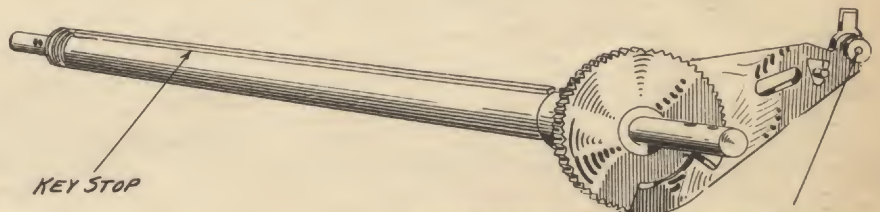
223 THE THREE PARTS ABOVE MUST BE REMOVED TO STRIP SHAFT OF HAND MACHINE TO THE SAME CONDITION AS SHOWN AT LEFT.

## DISMANTLING THE R.H. SIDE OF CARRYING SHAFT.



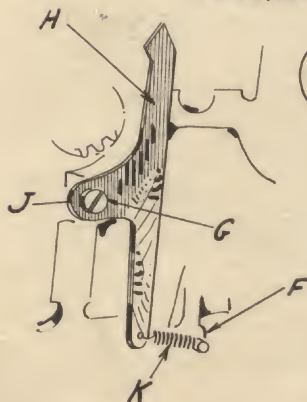
224 DRIVE OUT PINS 'A' 'B' WITH PROPER PUNCHES. USING V BLOCK 'E' AS SHOWN. THEN PULL OFF DRIVING GEAR AND CAM AND BUSHING 'D'

THE STRIPPED SHAFT NOW APPEARS AS BELOW.



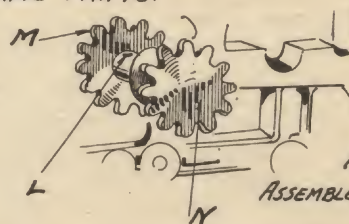
IF ABSOLUTELY NECESSARY FILE THIS STUD THEN DRIVE OUT WITH PROPER PUNCH ON LEAD ANVIL

## FURTHER DISMANTLING OF L.H. SIDE FRAME PARTS.



225 UNHOOK SPRING AT 'F' REMOVE SCREW 'G' AND TAKE OFF CHECK PAWL 'H' WITH LOOSE HUB 'J'

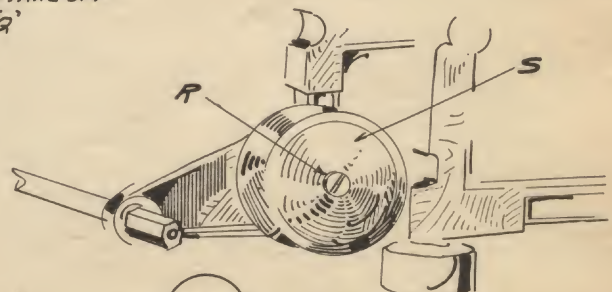
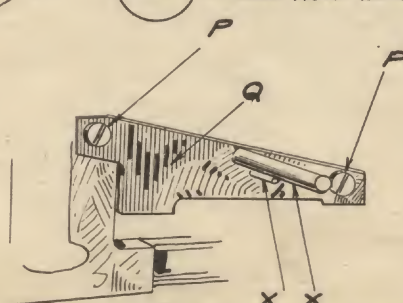
SAME ON HAND MACHINE EXCEPT SPRING 'K' IS LONGER.



226 DRIVE OUT PIN 'L' WITH PROPER PUNCHES. REMOVE GEAR 'M' AND PULL OUT GEAR 'N'

ASSEMBLE AGAIN LOOSELY TO PREVENT LOSS

227 REMOVE SCREWS 'P' AND TAKE OFF SPRING HOOK BLANK 'Q'



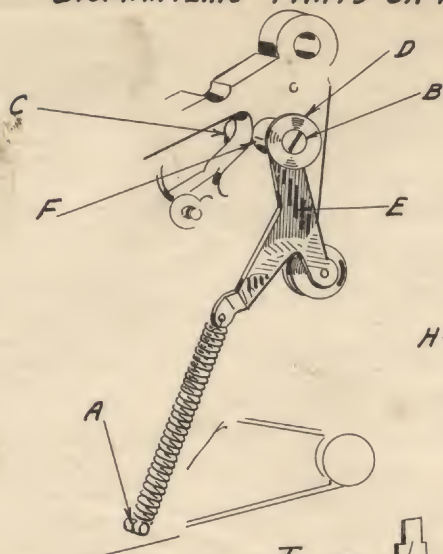
228 REMOVE SCREW 'R' AND TAKE OFF BELL 'S'

ABOVE IS SHOWN THE CONSTRUCTION OF THE AUTOMATIC MACHINE THE HAND MACH. PART REMOVES THE SAME WAY - DIFFERS ONLY IN CONSTRUCTION AT 'X'

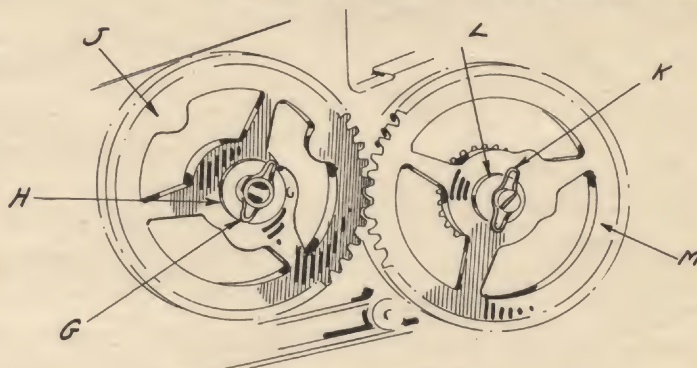


# DISMANTLING PARTS ON R.H. SIDE FRAME (K0 AND KAO MACHINES)

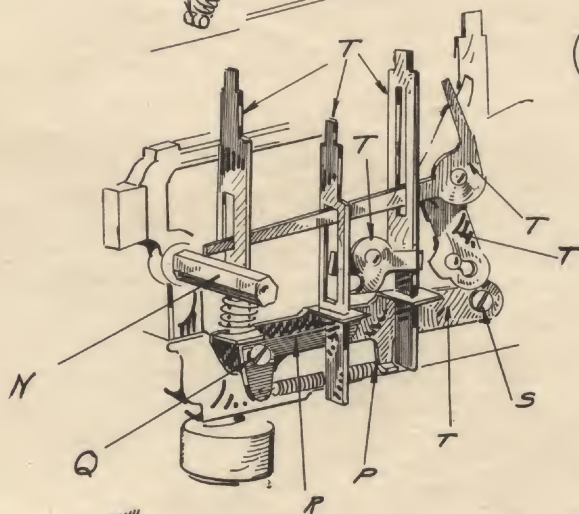
PLATE 33



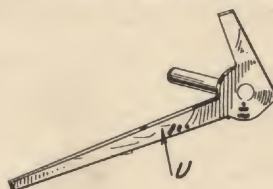
- 229 UNHOOK SPRING AT 'A' - HOLD SCREW 'B' WITH LARGE SCREW DRIVER WHILE  $\frac{5}{16}$  WRENCH USED TO REMOVE NUT 'C'. PARTS 'B', 'D', 'E' AND 'F' MAY BE REMOVED TOGETHER.



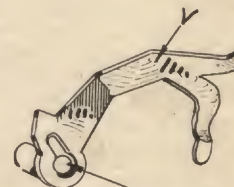
- 230 REMOVE CLIPS 'G' AND 'K' - REMOVE WASHERS 'H' AND 'L' - TAKE OFF GEARS 'J' AND 'M'.



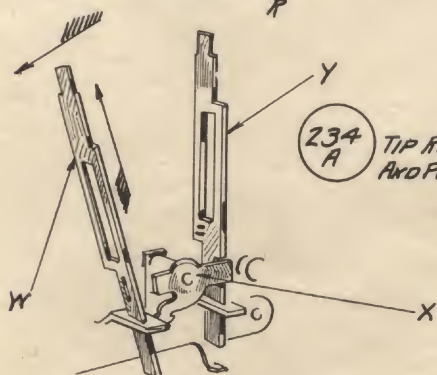
- 231 A UNHOOK SPRING 'P' - TAKE SCREW 'Q' OUT AND TAKE OFF LATCH 'R' - TAKE OUT SCREW 'S' - THIS WILL ALLOW BRACKET AND UNITS 'T' TO COME OFF.



- 232 A EXTRACT THE CLEARING LEVER 'U'

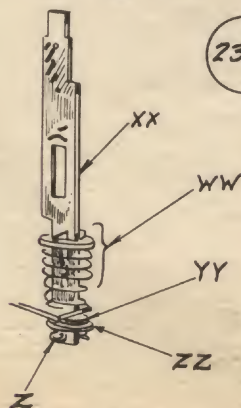


- 233 A MOVE KICKER 'V' TO POSITION SHOWN AND TAKE IT OFF.



- 234 A TIP REPEAT KEY STEM 'W' OVER AS SHOWN AND PULL IT UP OUT OF BRACKET.

- 235 A PULL THE KEY'S LEVER 'X' OFF FROM BRACKET STUD NON-REPEAT KEY 'Y' MAY NOW BE WITHDRAWN FROM BRACKET.

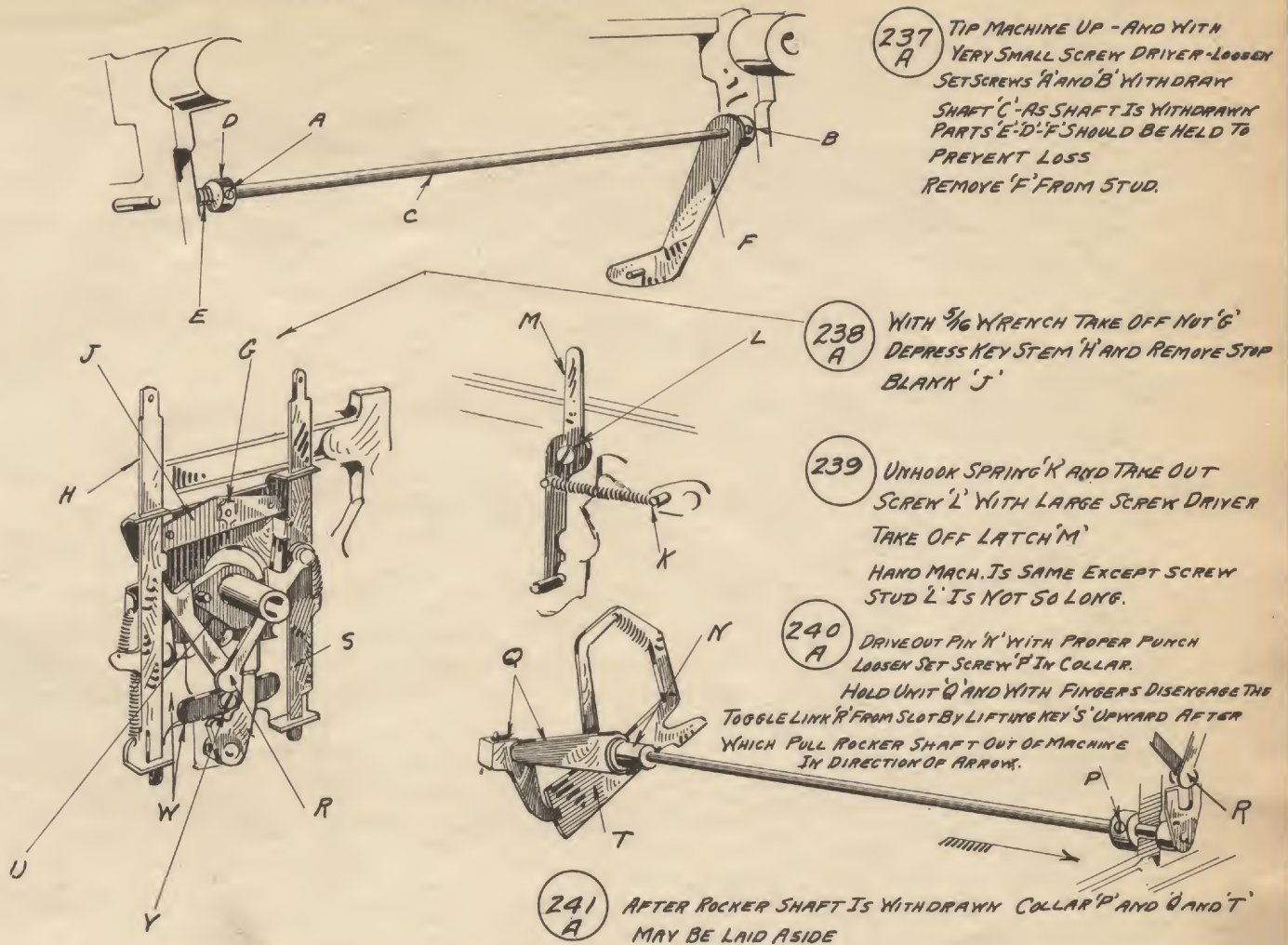


- 236 TO DISMANTLE CLEAR KEY STEM 'XX' REMOVE COTTER PIN 'Z' AND WASHERS 'ZZ' AND 'YY' STEM 'XX' MAY NOW BE WITHDRAWN WHILE HOLDING UNITS 'WW' TO PREVENT LOSS.

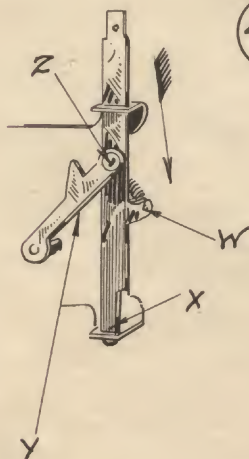
NOTE - ON HAND MACHINE ALTHOUGH GROUP SHOWN IN OPER. 231A DIFFERS IN CONSTRUCTION SLIGHTLY IT IS REMOVED AND DISMANTLED IN THE SAME SEQUENCE AND MANNER. (HAND MACHINE DOES NOT CONTAIN 'V' IN OPER. 233A)



## DISMANTLING THE HAND CUT OUT CAM UNITS.



**242 A** REMOVE KEY LOCK CAM 'U' - THEN TAKE OUT SCREW 'Y' WITH SMALL SCREW DRIVER, BRACKET 'W' MAY NOW BE REMOVED

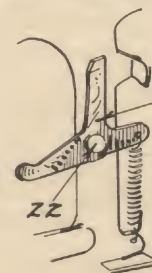


**243 A** TO TAKE OUT MINUS KEY LIFT IT OUT AT 'X' UNHOOK SPRING AT 'W' AND EXTRACT FROM UPPER SLOT BY PULLING DOWN IN DIRECTION OF ARROW

- NOTE -  
PLUS KEY IS HANDLED EXACTLY THE SAME WAY

DO NOT DISMANTLE TOGGLE LINK UNLESS ABSOLUTELY NECESSARY IF NEED BE FILE HEADING FROM RIVET 'Z' AND PUNCH OUT WITH PROPER PUNCH.

- NOTE  
DO NOT DISMANTLE THE LOCK PAWLS UNLESS ABSOLUTELY NECESSARY. IF NECESSARY FILE OFF THE HEADING OF RIVET 'ZZ' AND PUNCH OUT WITH PROPER PUNCHES.



- NOTE -  
MACHINE MAY NOW BE CONSIDERED STRIPPED - THE REMAINING OPERATIONS NECESSARY TO REMOVE CROSS MEMBERS - SIDE FRAME ETC. OFFER NO PROBLEMS, SIMPLY REMOVE THE SCREWS THAT HOLD THESE PARTS INTO PLACE.



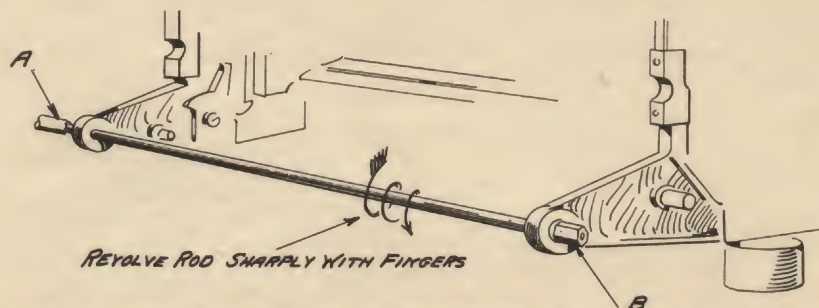
## NOTES ON THE ADJUSTMENT - REPAIR AND ASSEMBLY OF THE KÖANDKAÖ SERIES MACHINES

### IMPORTANT NOTE

IT IS GOOD PRACTICE WHEN A MACHINE HAS BEEN STRIPPED TO ITS FRAMES TO TAKE ADVANTAGE OF THE OPPORTUNITY TO INSPECT ALL ITS STUDS AND BEARINGS FOR TIGHTNESS AS WELL AS ITS SCREWS AND NUTS. THE FRAMES AND SPACING CASTING SHOULD BE INSPECTED FOR CRACKS.

SEE THAT THE FRAME TIE ROD AT REAR OF MACHINE HAS NOT BEEN SPRUNG. TO INSPECT THIS ROD - LOOSEN POSTS 'A' AND 'B' AND REVOLVE ROD WITH FINGERS - WATCH ENDS TO SEE THAT IT RUNS TRUE..

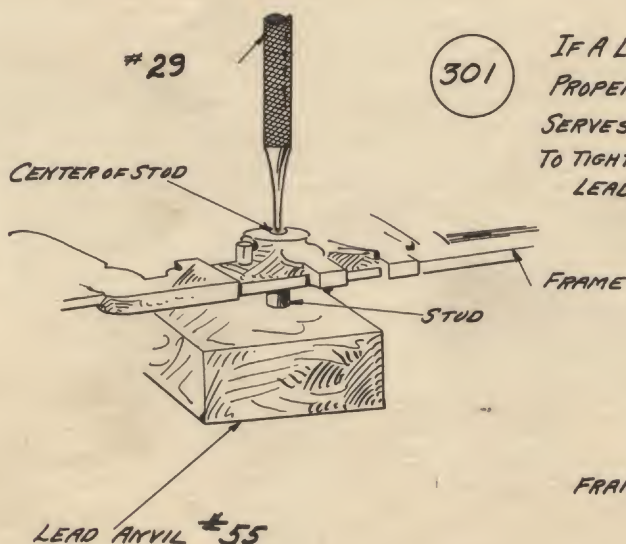
300



IF ROD IS FAULTY EITHER INSTALL A NEW ROD OR STRAIGHTEN THE OLD. IF ROD IS NOT STRAIGHT POSTS WILL NOT LINE UP WITH COVER SCREW HOLES AND CAUSE TROUBLE.

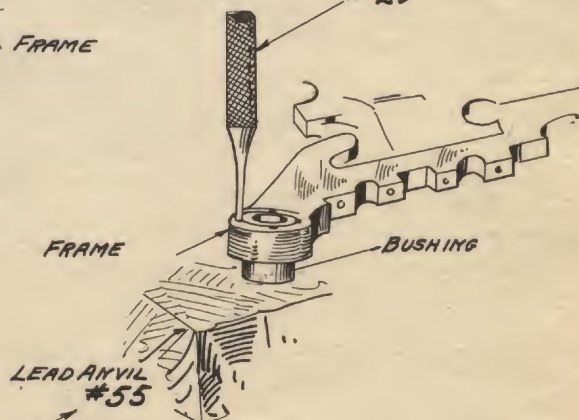
# 29

301



IF A LOOSE STUD OR BEARING STUD IS FOUND IT MAY BE PROPERLY SET UP WITH A FLAT PUNCH AS SHOWN - THIS SERVES TO SPREAD THE METAL THE NECESSARY AMOUNT TO TIGHTEN IT IN HOLE. WHEN RIVETING LAY THE STUD ON A LEAD ANVIL TO PREVENT INJURY.

# 29

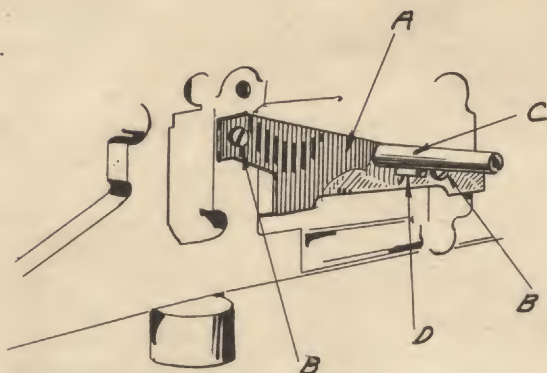


302

WHEN A BUSHING IS FOUND TO BE LOOSE - DO NOT PEEN IT WITH A HAMMER BUT SET IT SATISFACTORILY BY PEENING THE METAL WITH A PUNCH IN SEVERAL PLACES LIGHTLY AS SHOWN ABOVE AND AROUND THE EDGE.



## NOTES ON REASSEMBLING, REPAIR AND ADJUSTMENT KO AND KAO SERIES MACHINES



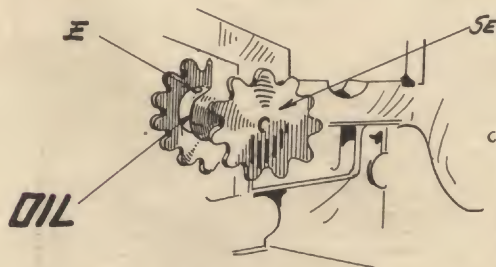
**303** ASSEMBLE SPRING HOOK BLANK 'A' BE SURE TO TIGHTEN SCREWS 'B' SECURELY WITH LARGE SCREW DRIVER AS THEY ALSO SERVE TO HOLD THE FRAME.

### — REPAIR NOTE —

ON THE AUTOMATIC MACHINE STUDS C-D ARE FOUND - INSPECT THE STUDS FOR LOOSENESS IF FOUND LOOSE PEEN THEM TIGHT WITH A FLAT PUNCH #29 B USING LEAD ANVIL TO PREVENT INJURY TO STUDS.

HAND MACHINE BLANK DOES NOT CONTAIN STUDS BUT IS ASSEMBLED THE SAME WAY.

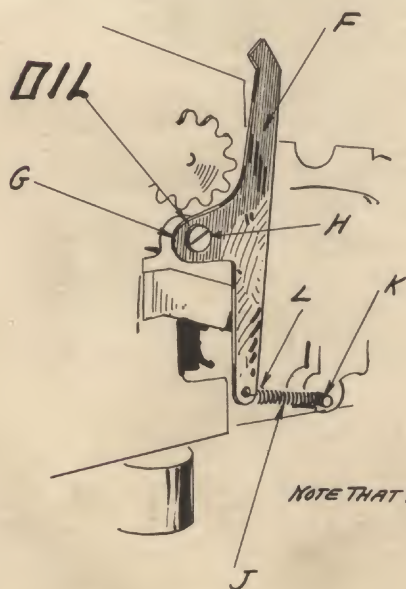
TO TAKE THIS PART FROM AN ASSEMBLED MACHINE PERFORM OPER. #4-106X(LH ONLY)-225-226 [HAND MACHINE]  
AUTO. MACH. #4-106X(LH ONLY) 176-177-178-180-181-182-185-186-187-189-210-211-212-225-227.



**304** ASSEMBLE EXTRA CARRY PINIONS AND SHAFT -  
- IMPORTANT NOTE -

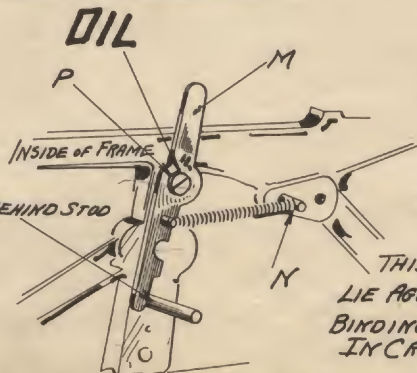
BE SURE THAT TAPER PIN 'E' HOLES LINE UP - DRIVE IN SECURELY WITH PROPER PUNCH. (THIS PART IS DIFFICULT TO TAKE OUT AND PROPER ATTENTION WHEN ASSEMBLING MAY SAVE MUCH TIME AND TROUBLE LATER)

TO TAKE THIS PART OUT OF AN ASSEMBLED AUTO MACHINE PERFORM OPER. #4-106-176-177-178-180-181-182-185-186-187-189-210-211-212



**305** ASSEMBLE THE EXTRA CARRY CHECK PAWL 'F'  
DO NOT FORGET TO ASSEMBLE COLLAR 'G' UNDER THE BODY OF THE PAWL 'A' TIGHTEN SCREW 'H' SECURELY WITH LARGE SCREW DRIVER - HOOK SPRING 'J' ON STUD 'K'  
SEE THAT LOOP 'L' IS CLOSED TO AVOID INTERFERENCE.

TO TAKE THIS PART OUT OF AN ASSEMBLED MACHINE OPERATIONS NOTED FOR #304 MUST BE PERFORMED



**306** ASSEMBLE THE DRIVING CRANK LATCH 'M' - HOOK UP SPRING TO POST 'X'.

TIGHTEN SCREW 'P' SECURELY WITH LARGE SCREW DRIVER.

### NOTE

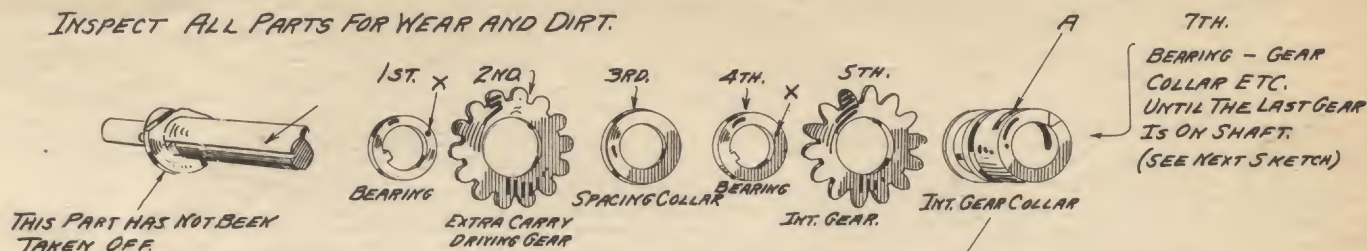
THIS PART MUST BE STRAIGHT AND LIE AGAINST THE CASTING BUT WITHOUT BINDING OTHERWISE IT WILL NOT MESH SLOT IN CRANK HANDLE

TO TAKE CRANK LATCH OUT OF AN ASSEMBLED MACHINE PERFORM OPERATIONS #4-106-111-239  
HAND. #4-106-111-239  
AUTO. 4-106-111-238



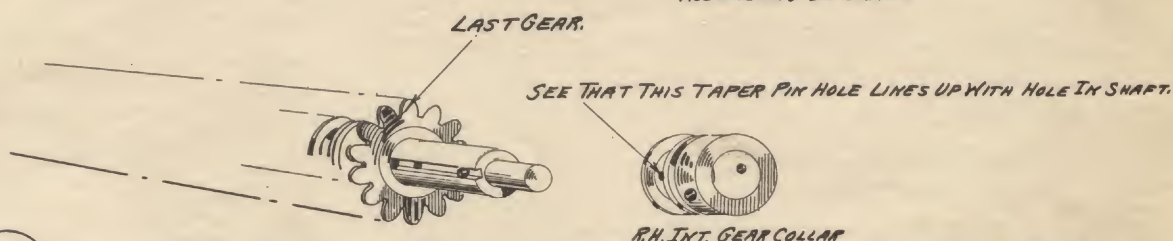
# NOTES ON REASSEMBLING THE WEDGE SHAFT-ALSO ADJUSTMENT AND REPAIRS.

INSPECT ALL PARTS FOR WEAR AND DIRT.



307 ASSEMBLE INTERMEDIATE GEAR SHAFT AS ABOVE

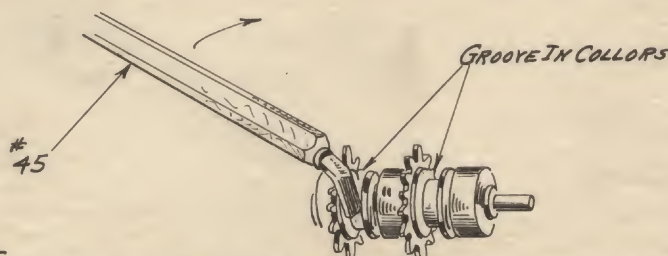
- NOTE - DO NOT TURN THIS COLLAR END FOR END-SEE THAT SLOT 'A' IS AT RIGHT WHEN ASSEMBLING ON SHAFT.



308 ASSEMBLE THE R.H. GEAR COLLAR. DRIVE IN TAPER PIN ON LEAD ANVIL WITH PROPER PUNCH.

- IMPORTANT NOTE -

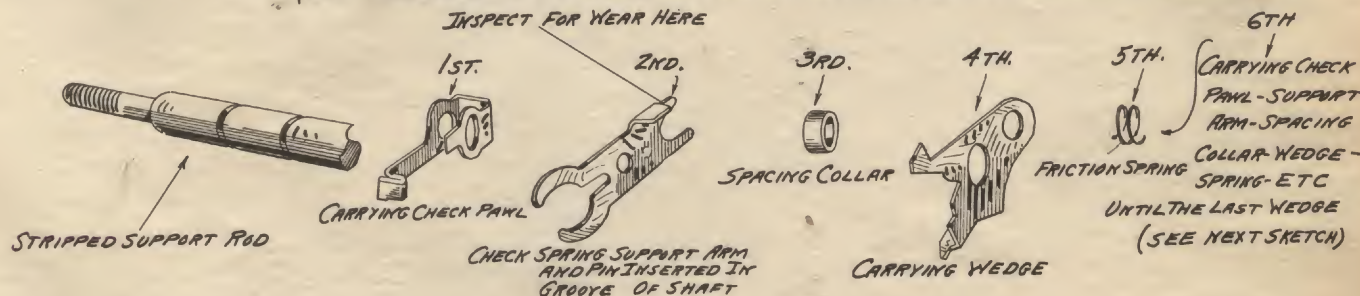
DO NOT DRIVE IN THE TAPER PIN UNTIL ASSEMBLED SHAFT IS ASSEMBLED PROPERLY. ALL GEARS ARE ON THEIR BEARINGS AND SURFACES OF ASSEMBLED PARTS FREE FROM DIRT. BE SURE TO ASSEMBLE THE PARTS IN THE ROTATION IN WHICH THEY WERE TAKEN OFF. IF NEW PARTS ARE TO BE INSTALLED SEE THAT THEY ARE FREE FROM BURRS AND CLEAN. IT SOMETIMES HAPPENS THAT NEW PARTS ARE OVERSIZE- THIS WILL SHOW UP WHEN R.H. GEAR COLLAR IS TO BE PINNED- IF COLLAR TAPER PIN HOLES DO NOT LINE UP BECAUSE OF OVERSIZE PARTS SMOOTH THE SURFACE DOWN A FEW THOUSANDTHS WITH EMERY CLOTH ON A FLAT SURFACE BY HAND.



- REPAIR NOTE -

IF AFTER R.H. GEAR COLLAR HAS BEEN PINNED AND AN END PLAY EXISTS IN THE INT. GEARS IT MAY BE TAKEN OUT BY USING TOOL # 45 AS SHOWN ABOVE. TOOL SERVES TO SPREAD THE COLLAR GROOVE SIDE AGAINST THE GEAR DO THIS OPERATION CAREFULLY TO PREVENT BINDING OF INT. GEARS. (LAY ASIDE THE INT. GEAR SHAFT UNTIL THE WEDGE AND CHECK MECHANISM IS ASSEMBLED)

INSPECT FOR WEAR HERE

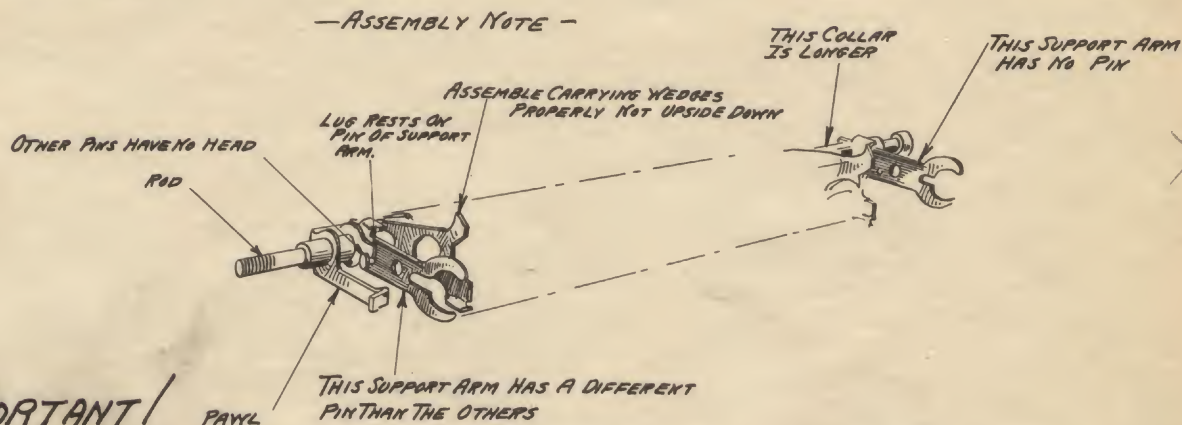
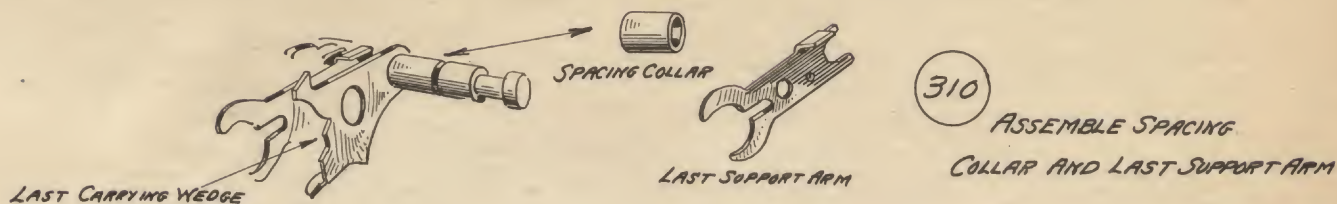


309 ASSEMBLE WEDGE AND CHECK MECHANISM (INSPECT FOR WEAR-DISTORTION-AND DIRT) ASSEMBLE IN THE SEQUENCE IT WAS TAKEN APART AND DO NOT MIX UNITS.



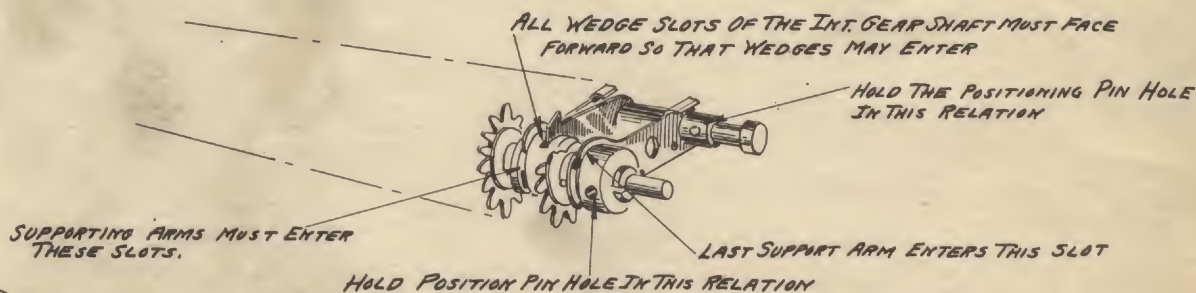
# PLATE 38

## NOTES ON ASSEMBLY OF WEDGE SHAFT ALSO ADJUSTMENT AND REPAIR.



**Important!**

THE UNITS OF THIS MECHANISM MAY BE EASILY ASSEMBLED WRONG - THAT IS - END FOR END - UPSIDE DOWN OR NOT IN PROPER SEQUENCE. THEREFORE CHECK THE ASSEMBLY CAREFULLY TO AVOID TROUBLE LATER.

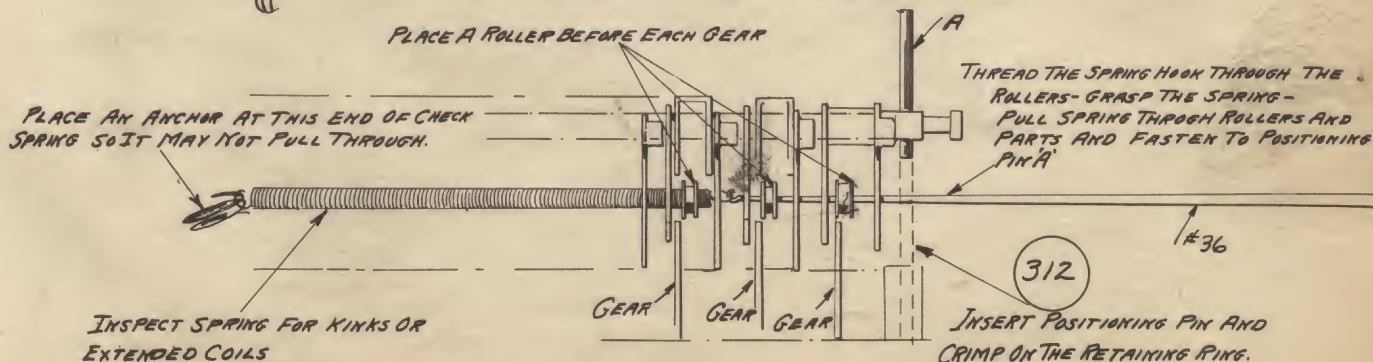


311 WHEN ALL THE SUPPORTING ARMS AND WEDGES ARE ENGAGED IN THEIR SLOTS BOTH SHAFTS MAY BE PRESSED TOGETHER WITH THE HANDS

— IMPORTANT —

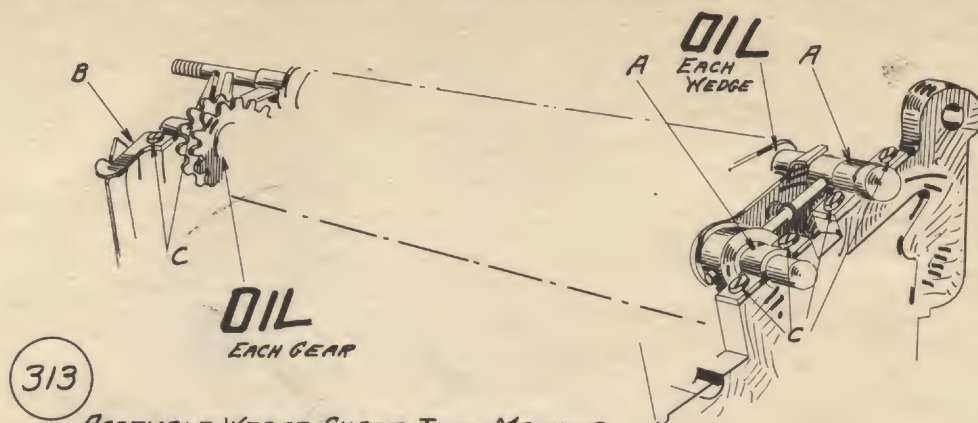


IT IS GOOD PRACTICE TO TIE THE SHAFTS TOGETHER WITH CLAMP #47 AT THIS POINT (USE TWO - ONE ON EACH END)





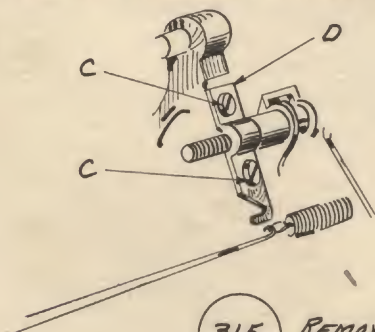
## NOTES ON ASSEMBLING THE WEDGE SHAFT ALSO REPAIR AND ADJUSTMENT.



313

### ASSEMBLE WEDGE SHAFT INTO MACHINE

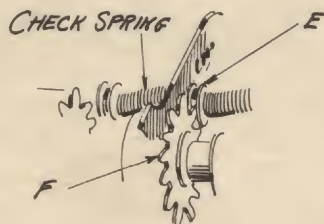
PUT ON CAP BEARINGS 'A' WITH SCREWS 'C' TIGHTEN SCREWS SECURELY WITH LARGE SCREW DRIVER.  
PUT ON LOCATING BRACKET 'B' WITH SCREWS 'C' ON HAND MACH. DO NOT ASSEMBLE BRACKET 'B' UNTIL LATER  
TO TAKE OUT WEDGE SHAFT FROM AN ASSEMBLED MACH. PERFORM  
OPERATIONS\* [HAND MACHINE] #4-106-147-148-150-152-153-154  
[AUTO. MACHINE] #4-106-147-148-149-150-151-152-153-154



314 REMOVE ANCHOR FROM CHECK SPRING-USE SPRING  
HOOK AND PLACE SPRING ON CAP BEARING HOOK.

ASSEMBLE CAP BEARING 'D' WITH SCREWS 'C' TIGHTEN  
SCREWS SECURELY WITH LARGE SCREW DRIVER.

315 REMOVE THE CLAMPS THAT WERE USED IN OPERATION\* 311



316

PLACE THE FLANGED ROLLERS ON CHECK SPRING  
OVER ONTO EACH INT. GEAR SO IT WILL ACT AS A  
DETENT FOR THE INT. GEAR

(A WEAK CHECK SPRING WILL CAUSE OVERTHROW OF INT. GEAR)

WEDGES OF THE WEDGE SHAFT SHOULD BE INSPECTED AT THIS POINT TO SEE THAT THEY ARE FREE  
AND DO NOT BIND. IF THEY DO BIND - INSPECT FOR DIRT AND STRAIGHTNESS. IF NOT TOO BADLY BENT  
A SLIGHT ADJUSTMENT MAY BE MADE WITH PLIERS.



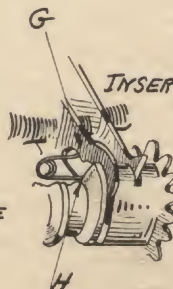
317

### INSERT WEDGE SPRINGS

USE SPECIAL PLIERS\* 17

DEPRESS SPRING WITH PLIERS AS SHOWN  
INSERT THE SPRING UNDER THE SLOT OF  
THE SUPPORTING ARM AS SHOWN  
AT 'G' AND 'H'

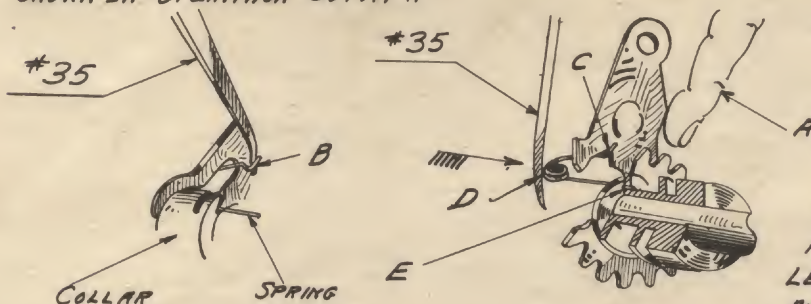
(THIS IS MERELY A PRELIMINARY  
OPERATION)





## NOTES ON REASSEMBLING WEDGE SHAFT ALSO REPAIRS AND ADJUSTMENTS

OPERATION #317 SERVES ONLY TO PLACE THESE SPRINGS UNDER CONTROL. AFTER EACH HAS BEEN SO PLACED PROCEED TO INSERT THEM WHERE THEY BELONG, WHICH IS UNDER THE WEDGE AND IN THE HOLE SHOWN IN OPERATION #307 AT 'X'



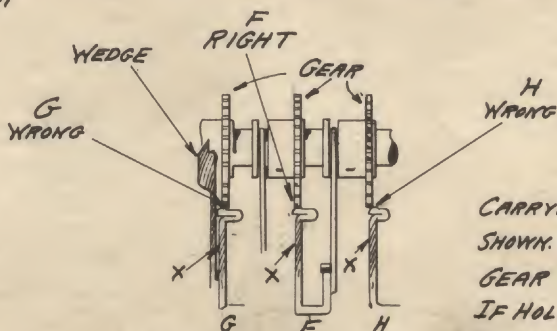
ASSEMBLE THE CARRYING WEDGE SPRING HOLD WEDGE UP WITH THE FINGER 'A' OF LEFT HAND - WITH RIGHT HAND USE TOOL #35 AND HOOK SPRING AT POINT 'B' - PULL SPRING

FORWARD AND TWIST IT UNDER THE WEDGE AT 'C' - THEN WITH SAME TOOL PUSH THE SPRING FORWARD AT 'D' UNTIL IT ENTERS HOLE 'E' IN COLLAR AND SNAPS INTO PLACE.

SOME SPRINGS MAY NOT GO IN EASILY (EXAMINE SPRING END FOR BURRS) VIBRATE THE WEDGE UP AND DOWN WHILE PRESSING WITH TOOL AT 'D'

### - TESTING NOTE -

AT THIS POINT EACH OF THE WEDGES SHOULD BE TESTED - MOVE THEM UP AND DOWN AND MAKE SURE THAT EACH WEDGE HAS A POSITIVE SPRING TENSION - WEAK SPRINGS CAUSE TROUBLE AND SHOULD BE SPREAD OUT OR REPLACED WITH NEW SPRINGS. ALSO DO NOT LEAVE A VERY STIFF SPRING IN THE MECHANISM

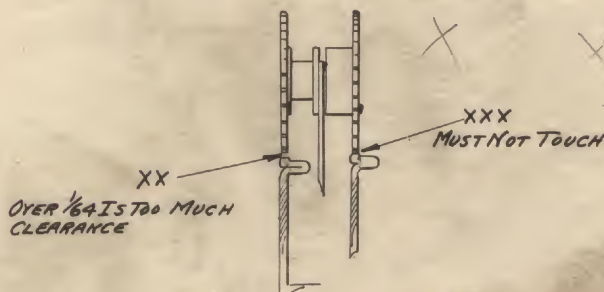


### - ADJUSTMENT NOTE -

CARRYING CHECK PAWLS HAVE A LEDGE AS SHOWN. THIS LEDGE MUST BE IN LINE WITH THE GEAR AS IN FIGURE 'F' (LITTLE MORE THAN FULL HOLD) IF HOLD LIKE 'H' IS ALLOWED IT WILL CAUSE INTERFERENCE WITH CARRYING ARMS ALSO IF MACHINE IS ABUSED IT WILL NOT CHECK INT. GEAR PROPERLY.

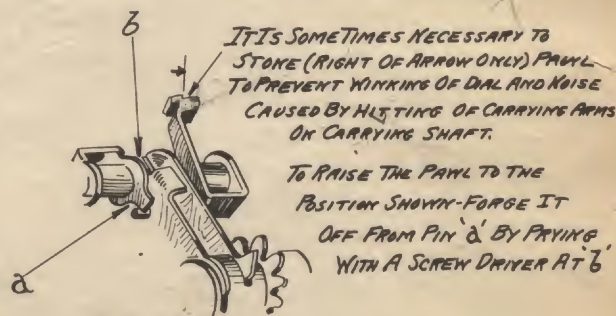
IF A HOLD LIKE 'G' IS ALLOWED - IT WILL NOT CHECK INT. GEAR PROPERLY AND BIND AGAINST WEDGE

TO REPAIR THIS CONDITION USE A PAIR OF PARALLEL PLIERS AT 'X' AND BEND TO SUIT THE CONDITION OF THE PAWLS - DO NOT BEND WEDGES - PAWLS BREAK EASILY - USE CARE IN BENDING.



THE 'XX' CONDITION WILL CAUSE AN OVERTHROW OF INT. GEAR. DETERMINE WHICH PAWL IS THE CAUSE AND REPLACE IT.

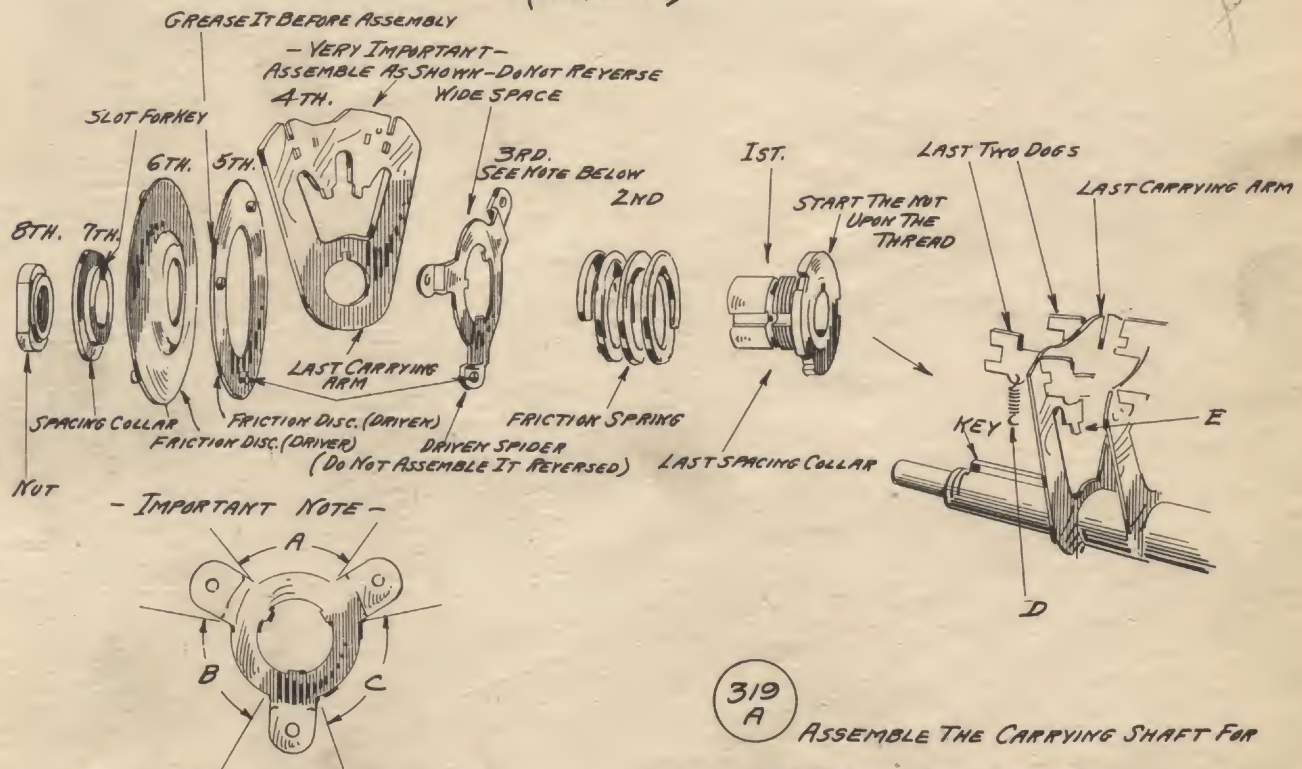
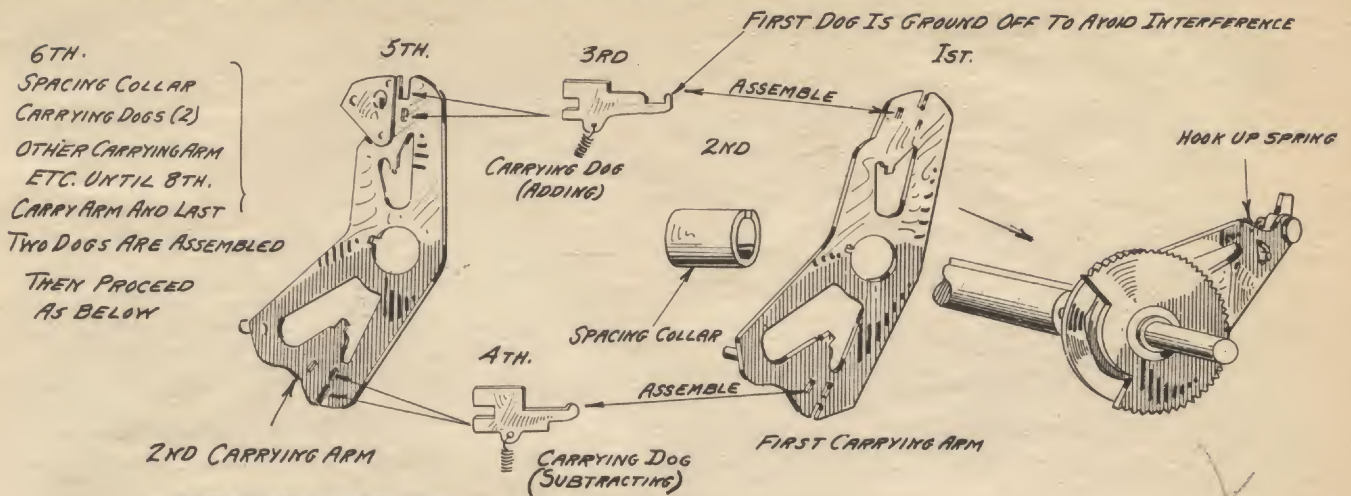
IF MACHINE IS NOT ABUSED NO TROUBLE WILL FOLLOW FROM THIS CAUSE.



TO REPLACE USE SCREW DRIVER AS BEFORE AND STRAIGHTEN PART WITH PLIERS IF BENT



## NOTES ON ASSEMBLING THE CARRYING SHAFT.



319  
A

ASSEMBLE THE CARRYING SHAFT FOR  
THE AUTOMATIC MACHINES.

- NOTES -

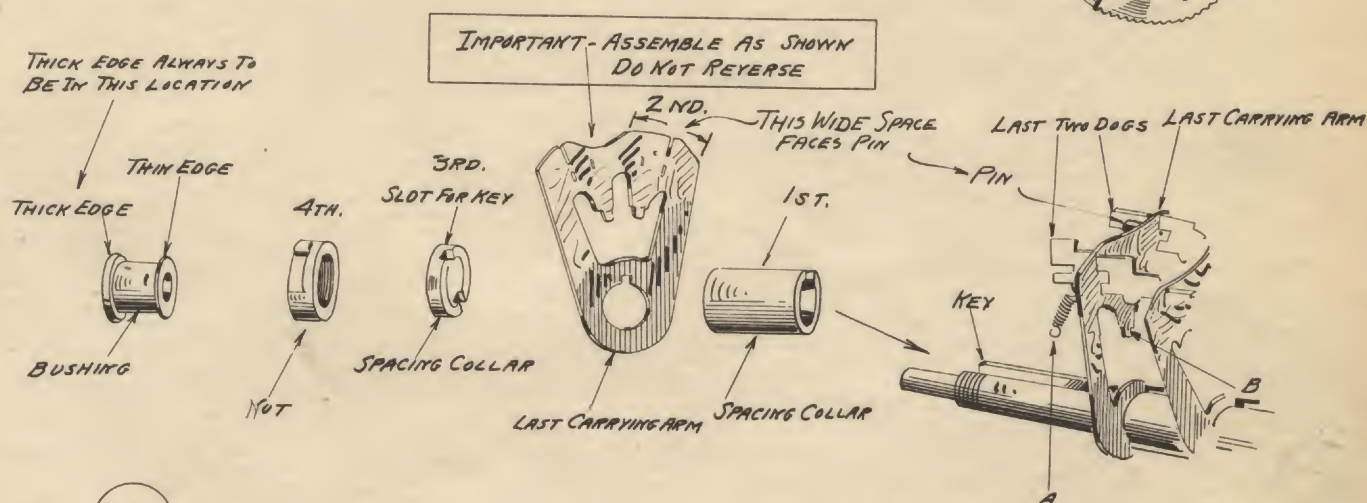
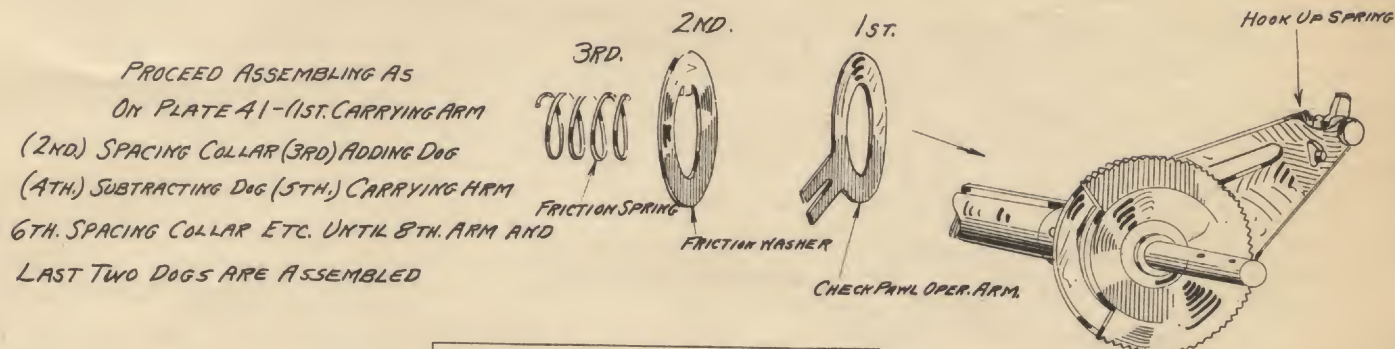
BEFORE TIGHTENING NUT SEE THAT ALL DOGS ARE IN THEIR  
SLOTS PROPERLY. TIGHTEN NUT VERY TIGHT WITH WRENCH \* 7 NUT MUST THEN BE STAKED WITH  
A FLAT PUNCH IN 3 SPOTS SLIGHTLY BUT SO IT WILL CHECK NUT.

HOOK EACH CARRYING DOG SPRING 'D' TO CARRYING ARM LUGS 'E' SEE THAT EACH SPRING HAS  
A GOOD LOOP

IMPORTANT - BEFORE ASSEMBLING ABOVE UNITS LOOK FOR WEAR - DISTORTION - LOOSE PINS - BRONEX OR  
WEAK PARTS - ETC.



## NOTES ON ASSEMBLING THE CARRYING SHAFT



320

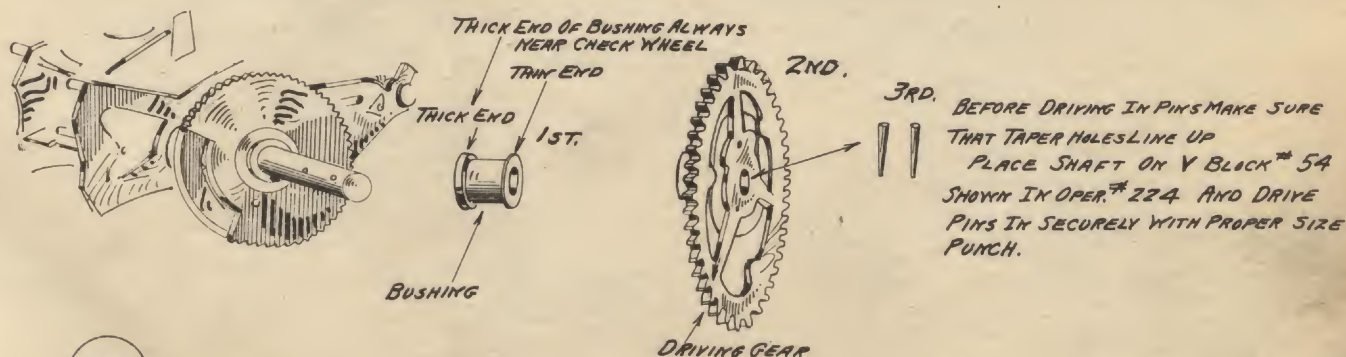
## ASSEMBLE THE CARRYING SHAFT FOR HAND MACHINES

### - NOTES -

BEFORE TIGHTENING NUT WITH WRENCH #8 SEE THAT ALL DOGS ARE IN THEIR SLOTS PROPERLY  
TIGHTEN NUT VERY TIGHTLY. HOOK EACH DOG SPRING 'A' TO EACH OF THE LUGS 'B' SEE THAT EACH SPRING  
HAS A GOOD LOOP

### IMPORTANT

BEFORE ASSEMBLING ABOVE UNITS LOOK FOR WEAR - DISTORTION - LOOSE PINS BROKEN OR WEAK PARTS ETC.

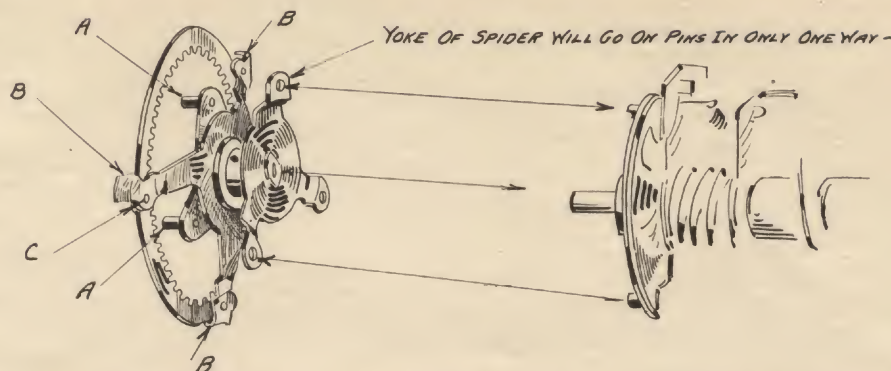


321

## ASSEMBLE RIGHT END OF SHAFT (BOTH MACHINES ALIKE)



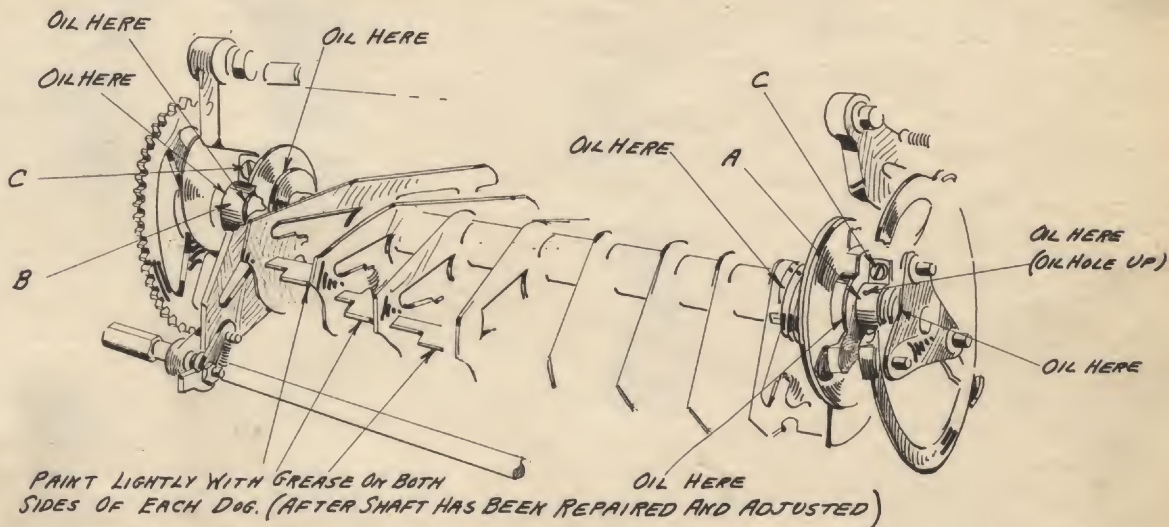
## NOTES ON ASSEMBLING THE CARRYING SHAFT



BEFORE ASSEMBLING LOOK FOR EXCESSIVE WEAR AT 'B'. LOOSE OR BROKEN PINS AT 'A'. LOOSE RIVETS AT 'C' - LOOSE RIVET 'C' MAY BE REPAIRED - TROUBLES AT 'A'-'B' HOWEVER ARE HARD TO ATTEND TO AND AN ENTIRE NEW UNIT SHOULD BE ORDERED.

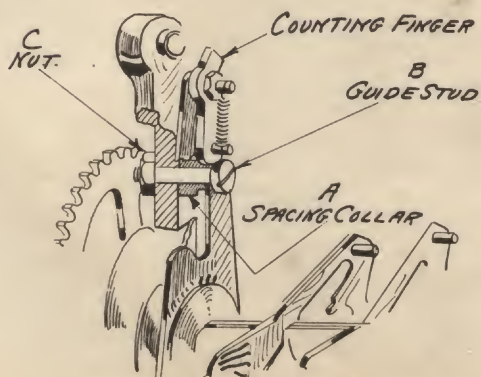
322  
A

ASSEMBLE THE PLANET GEAR SPIDER OF THE AUTOMATIC CARRYING SHAFT.



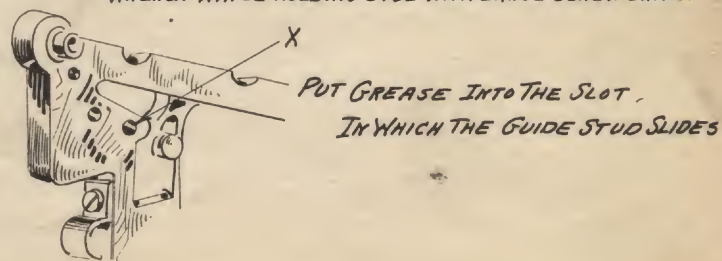
323

ASSEMBLE CARRYING SHAFT INTO MACHINE FASTEN CAPS 'A'-'B' WITH SCREWS 'C' TIGHTLY WITH LARGE SCREW DRIVER.



324

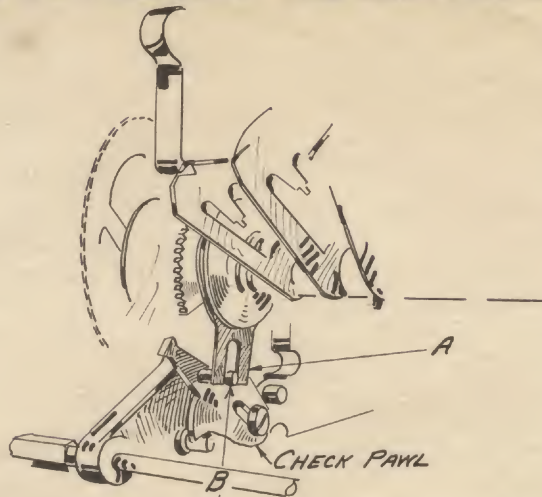
PLACE THE COUNTING FINGER AND ASSEMBLE GUIDE STUD 'B' WITH COLLAR 'A' INTO HOLE IN FRAME MARKED 'X' IN SKETCH. BELOW TIGHTEN NUT 'C' SECURELY WITH A  $\frac{5}{16}$ " WRENCH WHILE HOLDING STUD WITH LARGE SCREW DRIVER





## NOTES ON ASSEMBLING THE CARRYING SHAFT

325



PLACE THE SLOT OF THE CHECK PAWL OPERATING ARM 'A' ON THE STUD 'B' OF CHECK PAWL

THIS CHECK PAWL WAS NOT DISMANTLED WHEN MACHINE WAS STRIPPED.

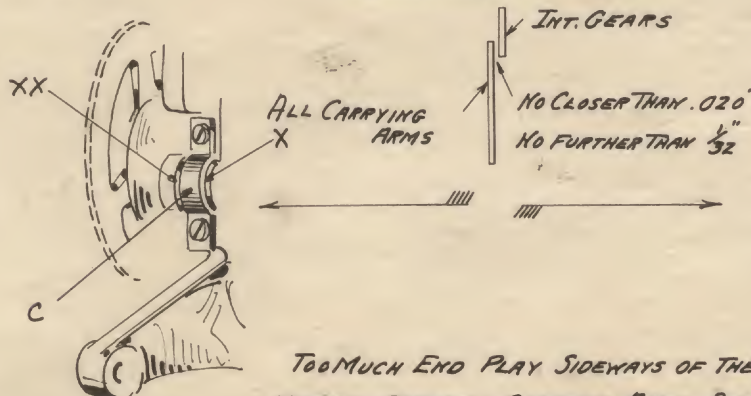
- NOTE -

THE CARRYING SHAFTS OF HAND AND AUTOMATIC MACHINES ARE NOW ASSEMBLED AND READY FOR LINING UP AND FREEDOM OF MOVEMENT.

TO TAKE A CARRYING SHAFT OUT OF AN ASSEMBLED HAND MACH. PERFORM OPER. 4-106X[REAR] 210 211-212

TO TAKE A CARRYING SHAFT OUT OF AN ASSEMBLED AUTOMATIC MACH. PERFORM OPER. 4-106-177-178-180 181-182-185-186-187-210-211-212

### - ADJUSTMENT NOTES -

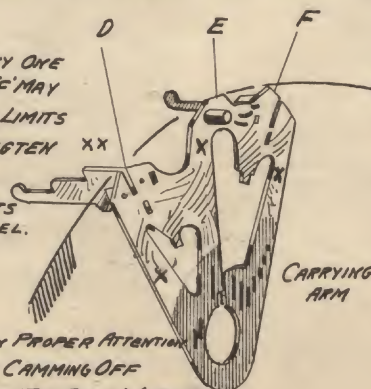


TEST SHAFT FOR FREEDOM FIRST IF TIGHT IT IS EITHER A BENT SHAFT. TIGHT BEARING CAP OR NO END PLAY. IF SHAFT IS BENT SEND IT TO FACTORY TO BE STRAIGHTENED IF NO END PLAY GEAR SHOULD BE TAKEN OFF AND HUB FILED A VERY LITTLE. IF TIGHT BEARING CAP - TAKE OFF CAP AND FILE 'C' FOR BETTER FIT. FOR BUSHING.

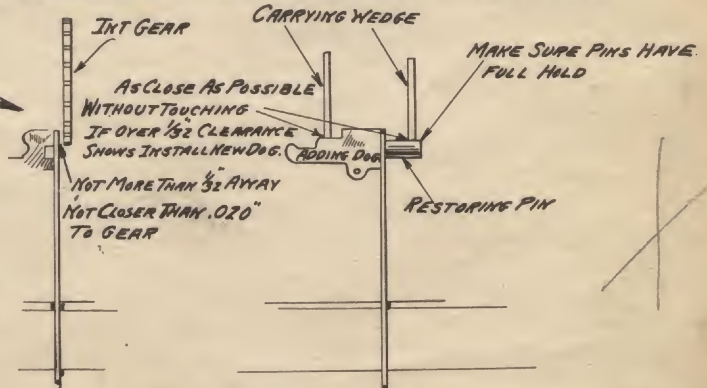
TOO MUCH END PLAY SIDEWAYS OF THE SHAFT WILL DESTROY THE FINE LOCATION NEEDED BETWEEN CARRYING ARMS, DOGS, PINS AND INT. GEARS.

THEREFORE PUTTING IN THIN WASHERS AT EITHER 'X' OR 'XX' DETERMINE IN WHICH DIRECTION IT IS BEST TO THROW THE SHAFT IN RELATION TO THE INT. GEARS AS SHOWN ABOVE

IF ARM IS NOT FLAT ANY ONE OF THE THREE POINTS D-E-F MAY BE OUT OR IN OVER THE LIMITS SHOWN. BE SURE TO STRAIGHTEN THE ARM SO IT WILL BE TRUE AT THESE POINTS WITH A PAIR OF PARALLEL PLIERS AT 'X'



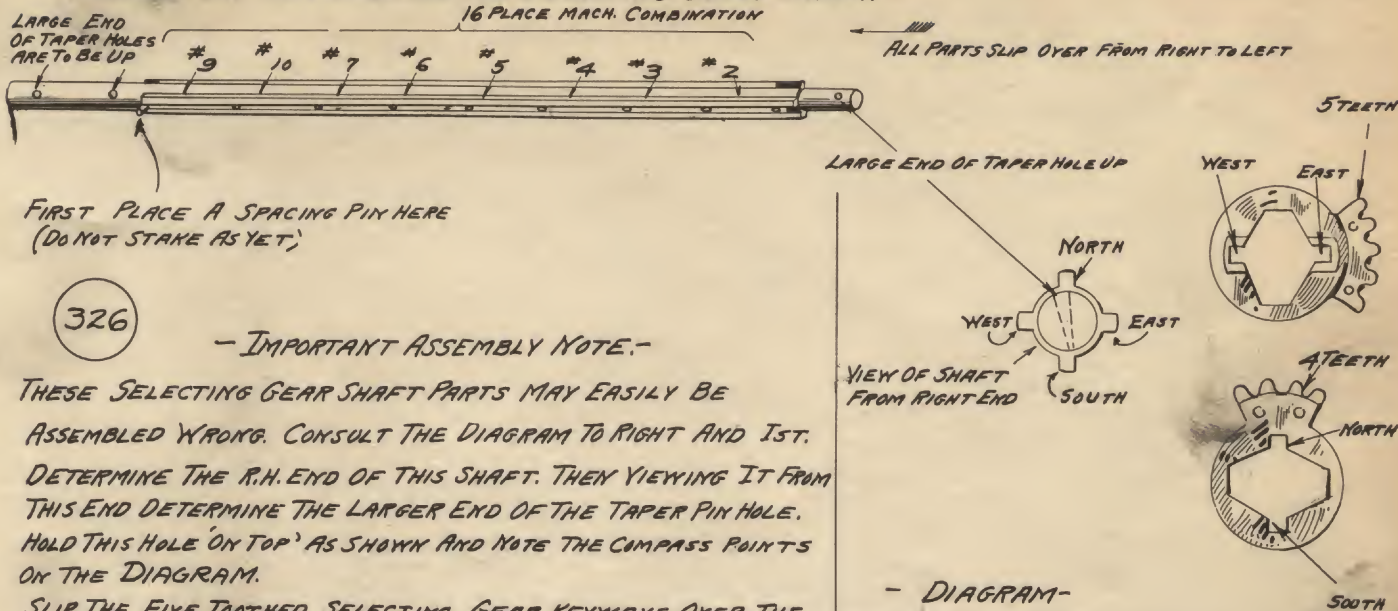
IF THIS ARM IS NOT GIVEN PROPER ATTENTION AS ABOVE IT WILL CAUSE CAMMING OFF TROUBLES AT 'XX' OF THE DOGS WHEN THEY ENGAGE THE WEDGES.



IF DOG OR PIN HIT IT WILL CAUSE NOISE - TO STOP THIS STONE PARTS SLIGHTLY.



## NOTES ON ASSEMBLING THE SELECTING GEAR SHAFT.

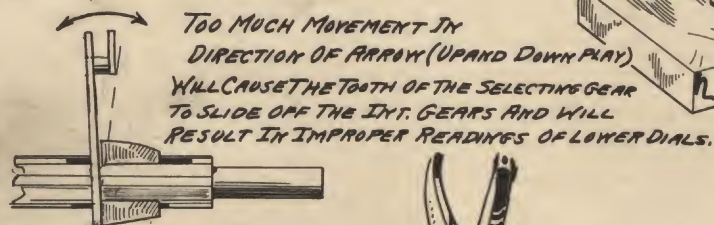


## 327 STAKE IN THE SPACING PINS IN SELECTING GEAR SHAFT

PLACE THE PINS INTO THE HOLLOW PUNCH OF STAND #41  
 PLACE PUNCH OVER PIN AND STRIKE IT WITH HAMMER  
 DO A GOOD JOB AS A LOOSE PIN HERE WILL FALL OUT AND CAUSE MUCH TROUBLE

## — INSPECTION NOTE —

NO MOVEMENT OR EXCESSIVE LOOSENESS CAN BE TOLERATED IN THE KEYWAYS OF THE SELECTING GEARS.



TO REPAIR THIS CONDITION USE TOOL #19

TO BRING THE KEYWAYS TOGETHER WITH A SLIGHT BEND. USE PLIERS ON TWO PLACES TOP AS SHOWN AND BOTTOM AT 'X'

IN CASE YOU HAVE TIGHTENED THE GEAR IT MAY BE RELEASED BY REVERSING THE PLIERS AND REBENDING IT SLIGHTLY.

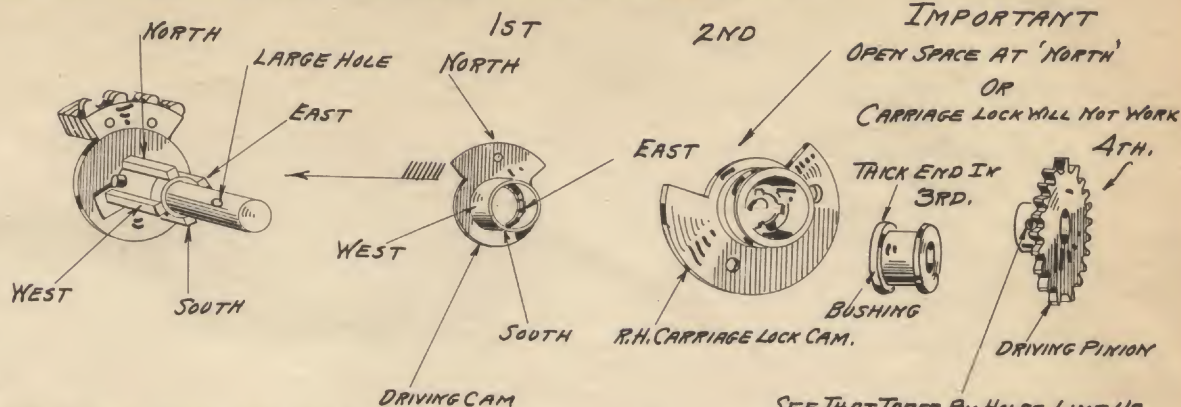
[THE ABOVE REPAIR CAN BE DONE WHEN SHAFT IS IN MACHINE.]



WORK PARTS ARE TO BE CONSIDERED BEYOND REPAIR - UNITS CONTAINING LOOSE RIVETS SHOULD BE RE-RIVETED OR REPLACED. SELECTING GEARS AND SHAFT MUST BE CLEANED THOROUGHLY. SELECTING GEARS MUST SLIDE FREELY ON KEYS OF SHAFT.

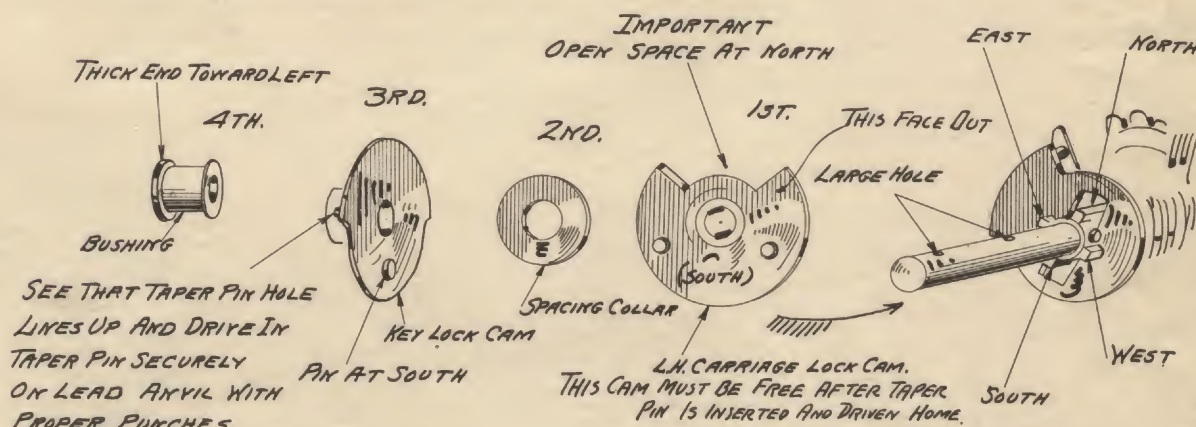


## NOTES ON ASSEMBLING THE SELECTING GEAR SHAFT



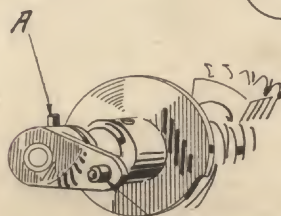
328 ASSEMBLE R.H. UNITS UPON THE SELECTING GEAR SHAFT IN THE SEQUENCE AND POSITION SHOWN ABOVE

SEE THAT TAPER PIN HOLES LINE UP AND DRIVE PIN IN WITH PROPER PUNCH ON LEAD ANVIL SECURELY.

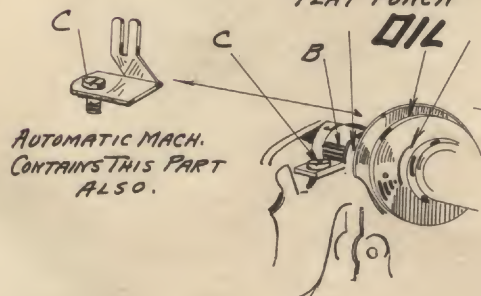


329 ASSEMBLE L.H. END OF SELECTING GEAR SHAFT AS PER SEQUENCE AND POSITION SHOWN ABOVE.

330 A ASSEMBLE THE CRANK ARM ONTO THE SELECTING SHAFT FOR AUTOMATIC MACHINE (DRIVE IN PIN 'A' WITH PROPER PUNCHES SECURELY ON LEAD ANVIL.)



REPAIR NOTE - THIS PIN IS APT TO LOOSEN. INSPECT FREQUENTLY AND RE-RIVET WITH A FLAT PUNCH



IMPORTANT SEE THAT THE CAMS ARE IN THE RIGHT POSITION BEFORE INSERTING SHAFT (SEE OPER #328 ABOVE)

331 ASSEMBLE SELECTING GEAR SHAFT INTO MACH. PUT ON CAP BEARINGS 'B' WITH SCREWS 'C' TIGHTEN SCREWS SECURELY WITH LARGE SC. DRIVER.

TO REMOVE SELECTING GEAR SHAFT FROM AN ASSEMBLED AUTOMATIC MACHINE PERFORM OPER # 4-106-111-130-131-133.  
HAND MACH. = #4-106-111-132-133.

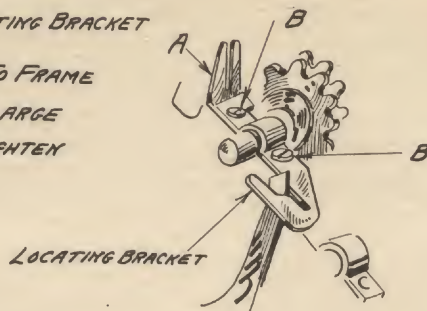


# PLATE 47

IT IS NOW POSSIBLE TO COMPLETE OPER. #313 PLATE #39 ATTACHING LOCATING BRACKET AND BEARING FOR INT. GEAR SHAFT.

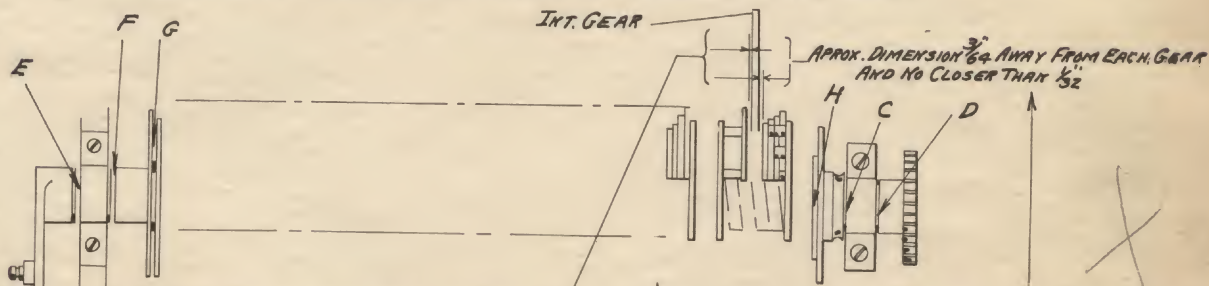
## 332 ASSEMBLING LOCATING BRACKET

ATTACH BRACKET 'A' TO FRAME WITH SCREWS 'B' USE LARGE SCREW DRIVER AND TIGHTEN SECURELY.



FOR HAND MACHINE ONLY.

## ADJUSTMENT AND REPAIR NOTES ON SELECTING GEAR SHAFT.



SHAFT MUST REVOLVE FREELY-IF TIGHT IT IS EITHER A BENT SHAFT-TIGHT BEARING CAP OR NO END PLAY-IF NO END PLAY TAKE OFF PINION AND FILE VERY LITTLE

IF CAP IS TIGHT FILE IT SLIGHTLY AT 'F'

IF SHAFT IS BENT SEND TO FACTORY

IF SELECTING GEARS CANNOT BE CENTRALIZED BY PUTTING WASHERS AT 'C' OR 'D' SELECTING GEARS OR SHAFT ARE DEFECTIVE AND NEW PARTS SHOULD BE INSTALLED.

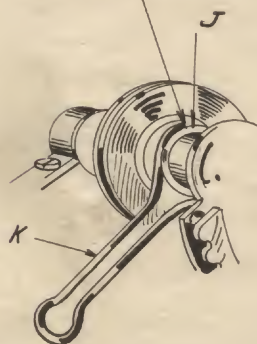
THIS SHAFT MUST HAVE LESS THAN .005" END PLAY MORE THAN THAT MUST BE TAKEN UP BY WASHERS INSERTED AT 'C' OR 'D.'

TO DETERMINE WHICH WAY TO THROW THE SHAFT LOOK AT THE POSITION OF THE SELECTING GEARS AND INT. GEARS AS SHOWN ABOVE AND CENTRALIZE THE SHAFT ACCORDINGLY

OILING INSTRUCTIONS. THE SHAFT KEYS AND SELECTING GEARS SHOULD ONLY BE OILED WITH AN ATOMIZER. TO POOR OIL UPON IT WILL IN TIME GUM IT UP AND CAUSE SELECTING GEARS TO STICK WITH DUST AND DIRT. PLACE A DROP OF OIL AT PLACES C-D-E-F-G-H

IT IS GOOD PRACTICE TO DISMANTLE AND CLEAN THE SELECTING GEARS AND SHAFT WHENEVER STICKY SELECTING GEARS GIVE TROUBLE WITH GASOLINE OR CLOTH.

PUT A LITTLE GREASE IN GROOVES (BOTH ENDS OF MACHINE)



THIS BRAKE MUST PROVIDE A GOOD DEFINITE TENSION - IF TENSION IS LOOSE IT WILL PREVENT CARRIAGE RELEASE WHEN CRANK HANDLE IS IN NEUTRAL. USE TOOL #19 TO BEND BRAKE AS SHOWN (BEND SLIGHTLY TO PREVENT BREAKING IT)

PRESSURE WITH PLIERS BENDS POINT DOWN

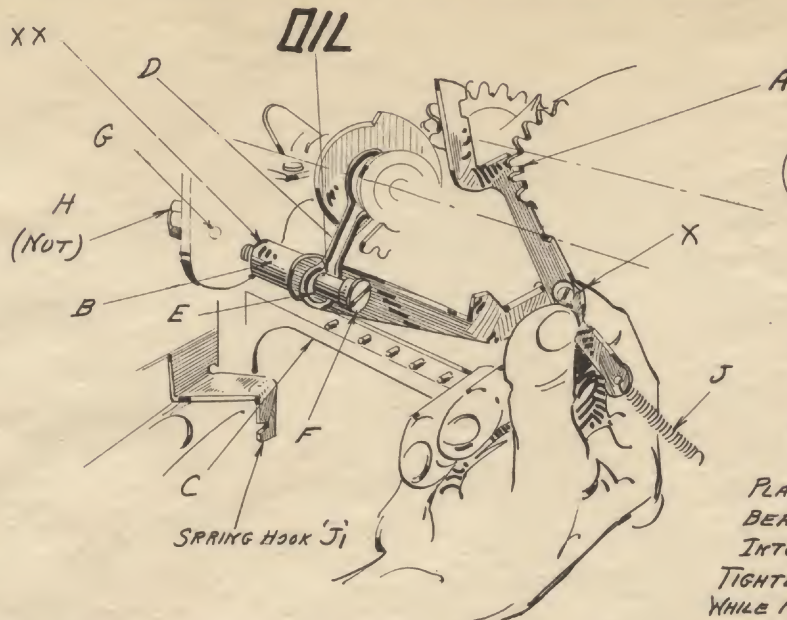


## 333 PLACE THE BRAKES FOR CARRIAGE LOCK CAMS (BOTH ENDS OF MACHINE) INTO THE GROOVES OF THE CAMS.

THIS ADJUSTMENT ON AN ASSEMBLED MACHINE MAY BE DONE WITHOUT REMOVING THE BRAKE.



## NOTES ON ASSEMBLING THE CARRIAGE LOCKS

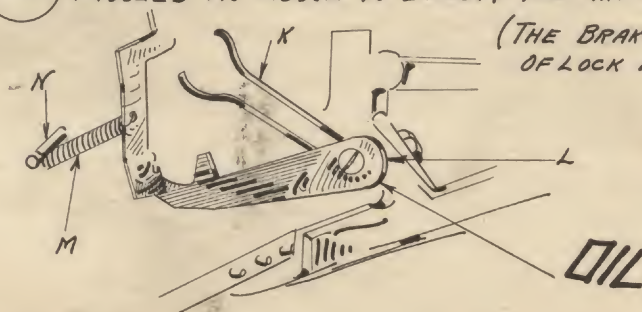


334 ASSEMBLE THE LEFT HAND CARRIAGE LOCK.  
WITH FINGERS GRASP PARTS AT 'X' AND INSERT 'A' BETWEEN THE LAST TWO GEARS OF INT GEAR SHAFT AT THE SAME TIME PLACE END 'B' UNDER SELECTING GEAR SHAFT AND ABOVE REAR SPACING CASTING.

PLACE BRAKE 'D' INTO POSITION 'E' AND INSERT BEARING STUD 'F' THROUGH LOOP OF 'D' INTO HUB 'B' AND HOLE 'G'.  
TIGHTEN NUT 'H' SECURELY WITH A  $\frac{5}{16}$ " WRENCH WHILE HOLDING STUD WITH A LARGE SCREW DRIVER  
TEST LOCK WHEN NUT IS SET TO SEE THAT IT WORKS FREELY IF TIGHT FILE VERY LITTLE AT HUB OF LOCK AT 'XX'  
HOOK UP SPRING 'J' AT 'J'

INSPECTION NOTE - BEFORE INSERTING THESE LOCKS  
INSPECT SCREW 'X' TO SEE THAT IT IS NOT TOO LOOSE.  
(THIS SCREW SHOULD HAVE FRICTION ENOUGH TO STAY SET - IF IT MOVES DURING USE OF MACHINE IT WILL DESTROY AN ADJUSTMENT NEEDED FOR THE CARRIAGE LOCK LATCH.

335 PROCEED AS ABOVE TO INSERT THE R.H. CARRIAGE LOCK.

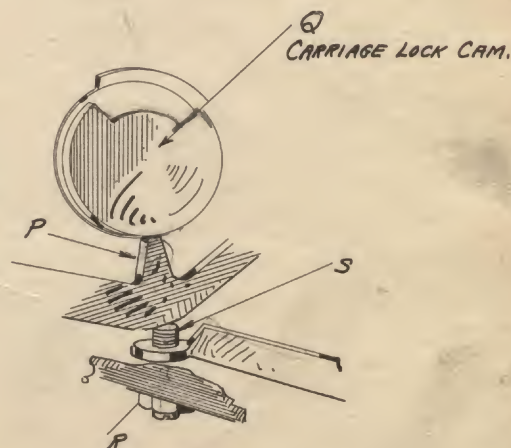


(THE BRAKE 'K' HOWEVER IN THIS CASE IS PLACED ON HUB OF LOCK AS SHOWN) HOOK SPRING 'M' UPON PIN 'N'.

ALL NOTES ABOVE APPLY ALSO TO THIS UNIT.

### - ADJUSTMENT NOTE -

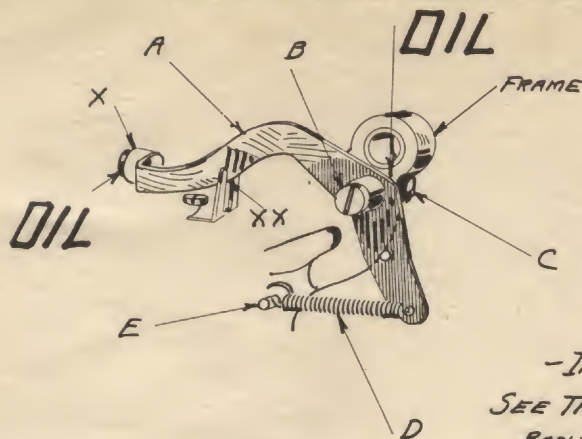
LUG 'P' ON CARRIAGE LOCK LEVER SHOULD BE ADJUSTED AS CLOSE AS POSSIBLE TO CAM 'Q' WITHOUT CAUSING CAMS TO BIND THIS IS DONE BY LOOSENING NUT 'R' AND TURNING ADJUSTING SCREW 'S' WITH LARGE SCREW DRIVER WHEN ADJUSTMENT IS MADE TIGHTEN NUT 'R' WITH  $\frac{3}{8}$ " WRENCH WHILE HOLDING SCREWS.



TO TAKE CARRIAGE LOCKS FROM AN ASSEMBLED MACH. PERFORM OPER # 4-106-111-145-146  
[SAME FOR HAND AND AUTO. MACH.]



## NOTES ON ASSEMBLING CARRIAGE SUPPORT ARMS.



336

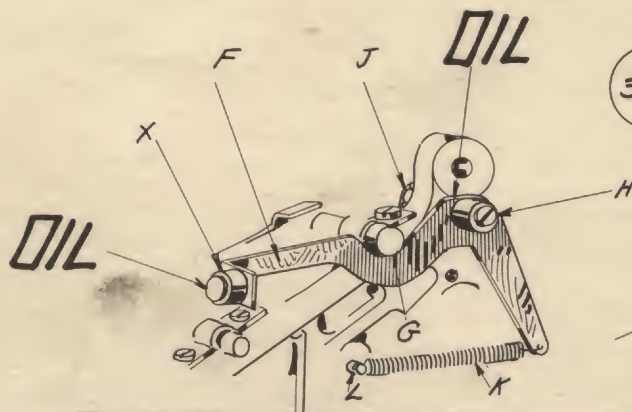
ASSEMBLE THE L.H. CARRIAGE SUPPORT ARM.

INSERT SCREW 'B' AND TIGHTEN BEFORE PUTTING ON CHECK NUT 'C' - SEE THAT ARM WORKS FREELY PUT ON CHECK NUT 'C' WITH  $\frac{5}{16}$ " WRENCH. HOOK SPRING 'D' TO STUD 'E'

(SEE THAT 'A' ENTERS AT 'XX')

-INSPECTION NOTE- (BOTH L.H AND R.H.)

SEE THAT ROLLERS WORK FREELY AND STUDS ARE NOT LOOSE OR BADLY HEADED. (RIVET IT IF LOOSE WITH FLAT PUNCH ON LEAD ANVIL)



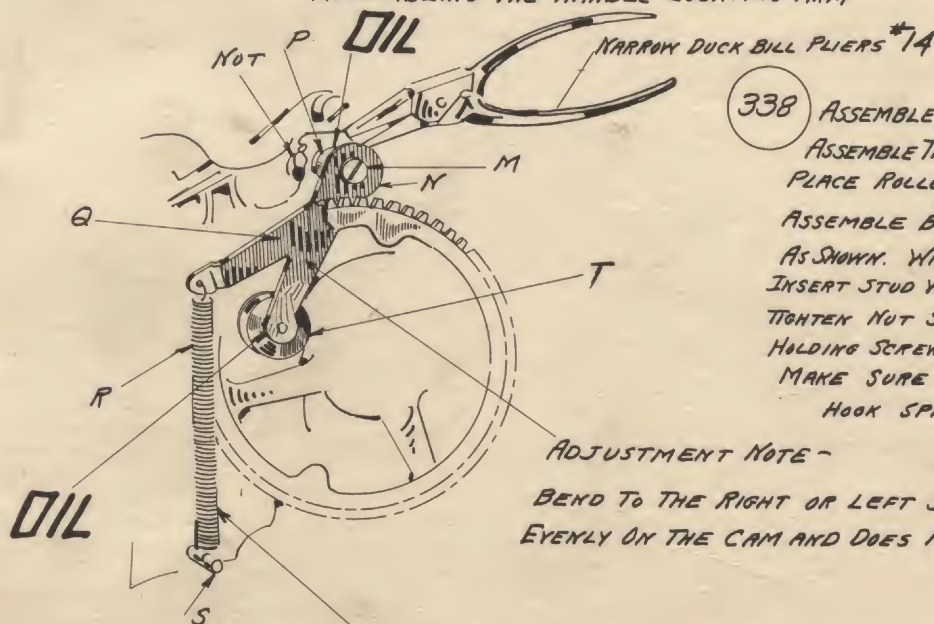
337

ASSEMBLE THE R.H. CARRIAGE SUPPORT ARM.

PLACE PART 'F' AS SHOWN - UNDER 'G' - INSERT SCREW 'H' AND TIGHTEN. BEFORE PUTTING ON CHECK NUT 'J' SEE THAT ARM WORKS FREELY PUT ON CHECK NUT 'J' WITH  $\frac{5}{16}$ " WRENCH.

HOOK SPRING 'K' TO STUD 'L'

## ASSEMBLING THE HANDLE LOCATING ARM



338

ASSEMBLE THE HANDLE LOCATING ARM - ASSEMBLE THE PART 'Q' - WASHER 'X' - HUB 'P' AND PLACE ROLLER ON CAM FACE AT 'T'

ASSEMBLE BETWEEN FRAME AND DRIVING GEAR AS SHOWN. WITH PLIERS HOLD THE NUT AND INSERT STUD WITH LARGE SCREW DRIVER.

TIGHTEN NUT SECURELY WITH  $\frac{5}{16}$ " WRENCH WHILE HOLDING SCREW WITH SCREW DRIVER

MAKE SURE THAT ARM WORKS FREELY

HOOK SPRING 'R' TO PIN 'S'

ADJUSTMENT NOTE -

BEND TO THE RIGHT OR LEFT SO THAT ROLLER RIDES EVENLY ON THE CAM AND DOES NOT CAUSE BINDING AS IT ROLLS.

A WEAK SPRING HERE IS UNDESIRABLE - IF TOO WEAK CUT OFF A FEW COILS OR INSTALL NEW SPRING.

TO TAKE OUT THIS UNIT FROM AN ASSEMBLED MACHINE DO NOT REMOVE DRIVING GEAR.



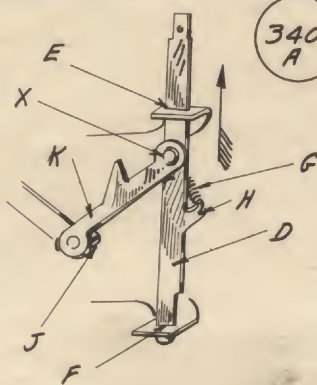
A hand-drawn diagram illustrating the rotation of an internal gear and its pinion. The internal gear is on the left, and the pinion is on the right. Arrows indicate the direction of rotation for each component. Labels include:

- ARROW ON SPACE (top left)
- ARROW ON SPACE (top center)
- ARROW ON TOOTH (top right)
- ARROW ON TOOTH (bottom left)
- B (bottom left)
- A (bottom center)
- C (bottom right)
- DRIVING GEAR ON CARRYING SHAFT (bottom right)
- INT. DRIVING GEAR AND PINION. (bottom center)

- ADJUSTMENT NOTE -

IF GEAR DOES NOT REVOLVE FREELY REMOVE THE CAUSE IT MAY BE DIRT OR A BURRED HUB

## NOTES ON ASSEMBLING ADD AND SUBTRACT KEYS AND BRACKET



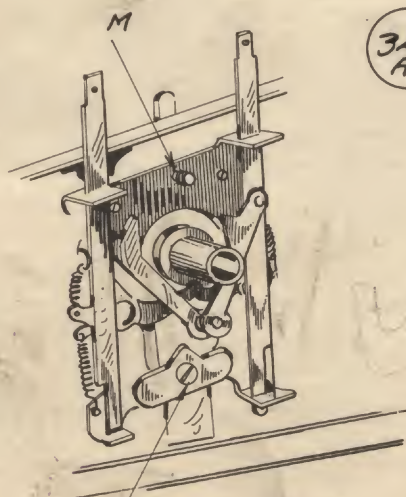
- 340 ASSEMBLE THE SUBTRACT KEY INTO THE BRACKET.

INSERT KEY STEM INTO TOP OF BRACKET AT 'E' PUSH UPWARD - THEN INSERT BOTTOM AT 'F' ATTACH SPRING 'G' AT 'H' ASSEMBLE STUD 'J' INTO HOLE OF ADDING TOGGLE LINK

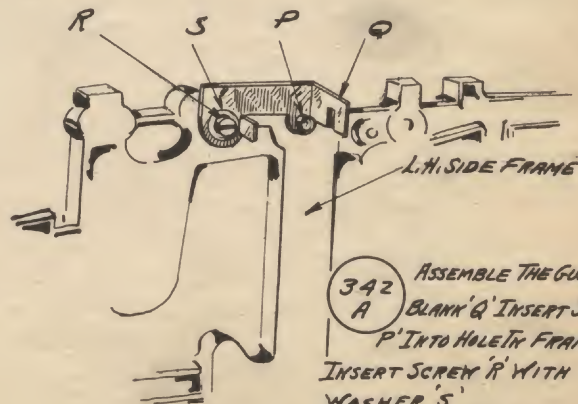
ADDING KEY IS ASSEMBLED THE SAME WAY IF TAKEN OUT

- ADJUSTMENT NOTE -

DO NOT ALLOW EXCESSIVE LOOSENESS OF PART 'X' AT 'X'  
IF TOO LOOSE STUD 'X' MUST BE HEADED DOWN TIGHTER WITHOUT  
BINDING PART 'X'. IF TOO TIGHT- KNOCK OUT RIVET FOR A NEW ONE




- 341  
A ASSEMBLE THE BRACKET FOR ADD AND SUBTRACT KEYS  
PLACE BRACKET ON 'M' PUT IN SCREW '2' TIGHTEN VERY  
TIGHTLY WITH SMALL SCREW DRIVER (NOTE THIS SCREW MUST  
NOT PROJECT THROUGH FRAME OR IT WILL INTERFERE)



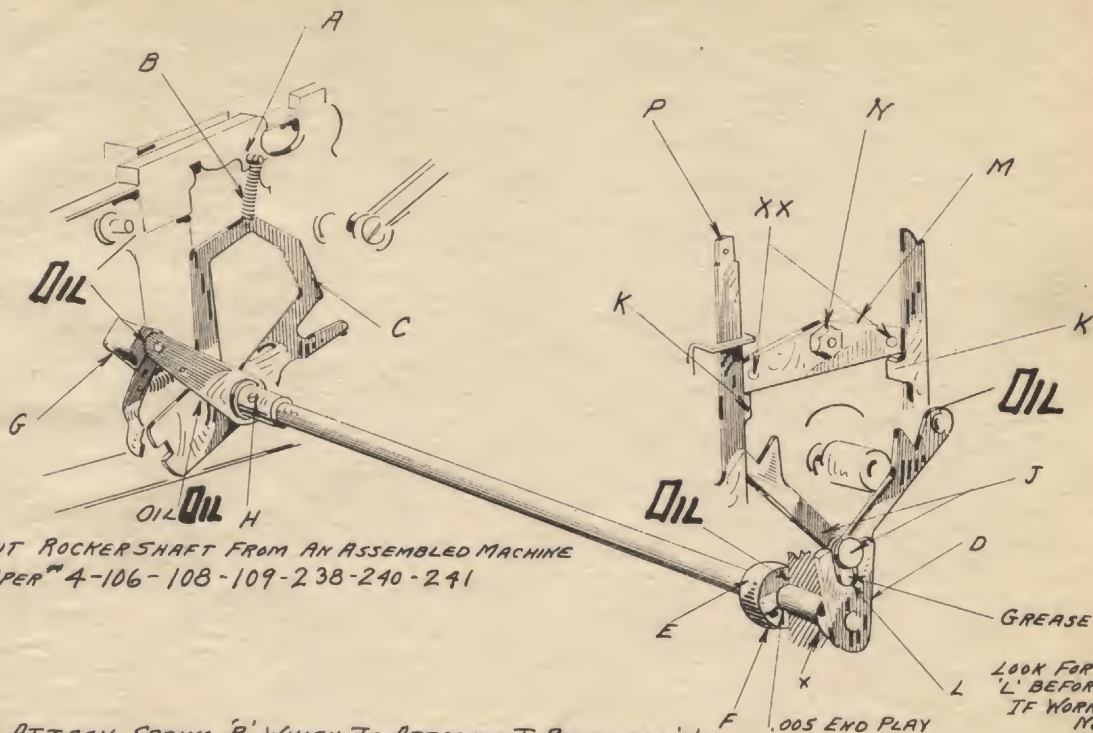
- 342 ASSEMBLE THE GUIDE  
A BLANK 'Q' INSERT STUD

INSERT SCREW 'P' WITH  
WASHER 'S'

2   $\frac{7}{16}$  MUST NOT BE LONGER

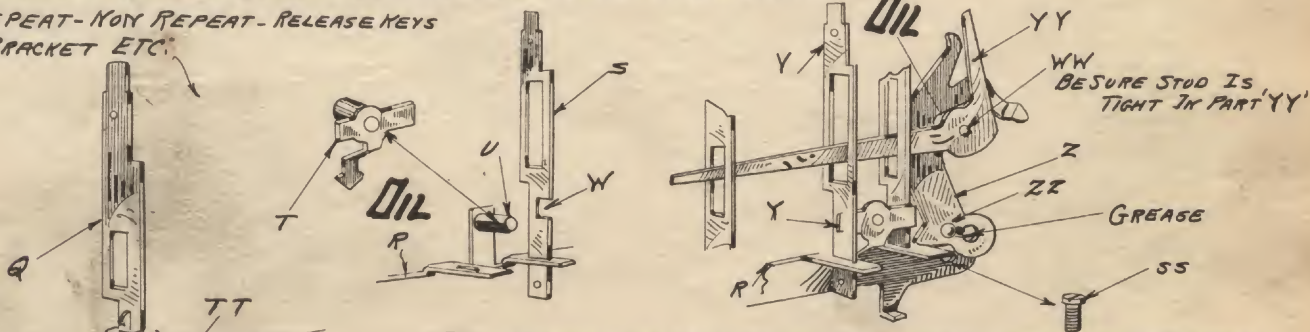


## NOTES ON ASSEMBLING THE ROCKER SHAFT.



TO TAKE OUT ROCKER SHAFT FROM AN ASSEMBLED MACHINE  
PERFORM OPER. 4-106-108-109-238-240-241

- 343 A ATTACH SPRING 'B' WHICH IS ATTACHED TO POSITIONER 'C' TO STUD 'A' - INSERT ROCKER SHAFT 'D' INTO HOLE IN FRAME AT 'X' PUSH THROUGH - AFTER PLACING COLLAR 'E' ON THIS SHAFT - PLACE ASSEMBLY 'G' AS SHOWN - ASSEMBLE SHAFT WITH PIN 'H' SECURELY TIGHTEN UP COLLAR SCREW 'F' TO LESS THAN .005" PLAY BETWEEN COLLAR 'E' AND INNER SIDE OF FRAME. PLACE TOGGLE LINKS 'J' INTO SLOT 'L' DEPRESS ADD AND SUBTRACT KEY STEMS 'P' AND INSERT STOP BLANK 'M' OVER THE LUG 'K' ITY TO THE HOLES 'XX' OF BRACKET PLACE NUT 'N' ON SCREW STUD - TIGHTEN THE NUT BUT DO NOT STRIP ITS THREAD - USE  $\frac{5}{16}$ " WRENCH AND HOLD SCREW WITH LARGE SCREW DRIVER.
- REPEAT - NON REPEAT - RELEASE KEYS BRACKET ETC.



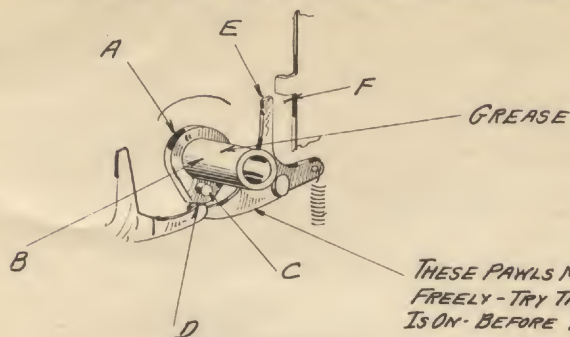
- 344 A ASSEMBLE CLEAR KEY STEM UNITS 'Q' AND INSERT INTO BRACKET 'R' (ASSEMBLE WASHERS AND CUTTER PIN) ASSEMBLE THE NON REPEAT KEY STEM 'S' AS SHOWN (RIGHT OF STUD 'U') INTO BRACKET ASSEMBLE KEY LEVER 'T' ON STUD 'U' PLACING R.H. WING INTO SLOT 'V' AS SHOWN - PLACING L.H. WING OF 'T' IN SLOT 'Y' PLACE RELEASE HOOK 'Z' ONTO STUD 'ZZ' - PLACE CLEARING LEVER 'YY' AS SHOWN. INSERT STUD 'WW' INTO HOLE IN FRAME AFTER BRACKET ASSEMBLY IS PLACED AGAINST FRAME INSERT SCREW 'UU' INTO LATCH 'YY' AND FASTEN TO FRAME THROUGH HOLE 'TT' INSERT SCREW 'SS' AT HOLE SHOWN - FASTEN SCREWS SECURELY WITH LARGE SCREW DRIVER HOOK SPRING TO 'RR' (ON HAND MACH. ASSEMBLY SAME, DOES NOT CONTAIN PART 'Z') NOTE - PART 'VV' SHOULD BE FREE ON STUD.

- NOTE - KEYS MAY EASILY BE INSERTED WRONGLY - TAKE CAREFUL NOTE OF SKETCHES AND INSERT KEYS AS SHOWN 'UU'

TO TAKE ABOVE BRACKET AND UNITS FROM AN ASSEMBLED MACHINE PERFORM OPER. 4-106-111-230-231 { HAND MACHINES AUTO



## NOTES ON ASSEMBLING LOCK CAM-DRIVING CRANK GEAR AND SELECTING ARMS.

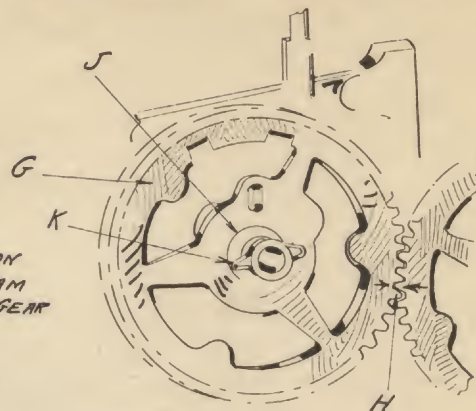


345  
A ASSEMBLE THE LOCK CAM 'A' ON BEARING STUD 'B' SEE THAT PIN 'C' FACES OUT. SEE THAT LOCK PAWLS 'E' ARE UNDER THE CAM AS SHOWN AT 'D' POINTS OF PAWL WILL THEN BE OUT FROM UNDER KEY STEM AT 'F'

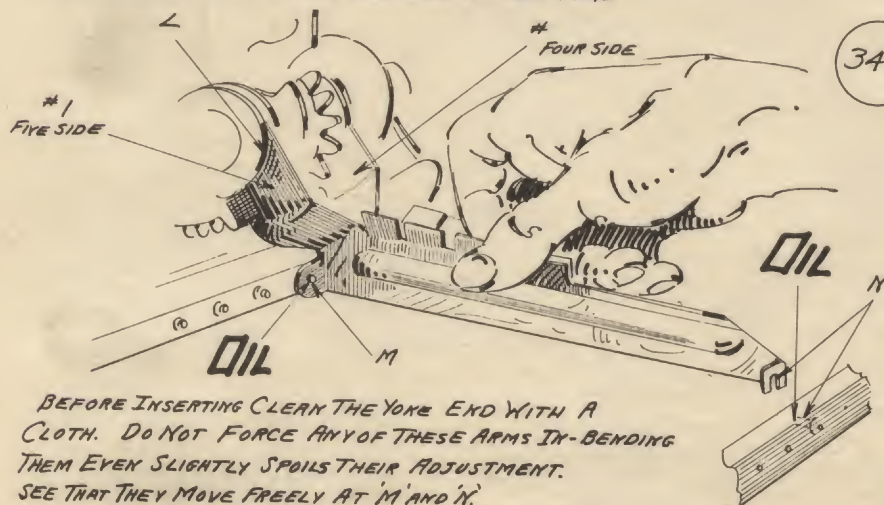
### - NOTE -

IT IS GOOD PRACTICE AFTER ASSEMBLING GEAR TO INSERT THE CRANK HANDLE AND TEST GEAR TRAIN FOR BIND

IT IS GOOD PRACTICE TO TEST THE HANDLE LATCH TO SEE THAT IT PROPERLY LOCKS THE HANDLE - ADJUSTMENT MAY EASILY BE MADE AT THIS TIME



346  
A GREASE STUD 'B' ASSEMBLE THE DRIVING CRANK GEAR 'G' SEE THAT ARROWS MESH AT 'H' - SEE THAT PIN 'C' IS IN SLOT OF GEAR HUB (AT BOTTOM) WHEN GEARS ARE PROPERLY MESHED. ASSEMBLE WASHER 'J' AND RETAINING RING 'K'.



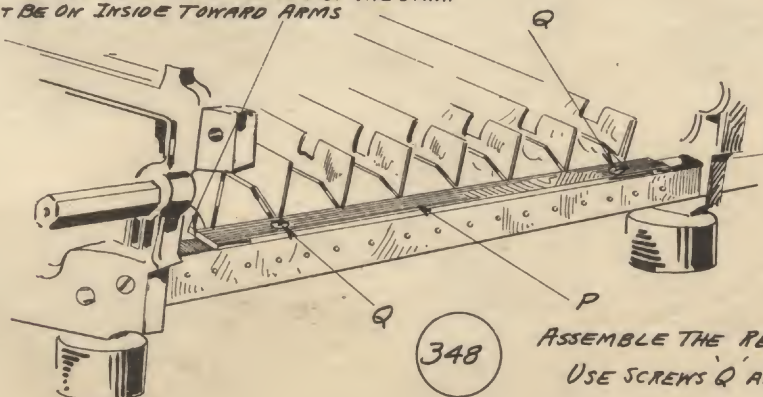
347 ASSEMBLE THE SELECTING ARMS. INSERT THE ARMS INTO THE SAME POSITIONS THAT THEY WERE DISMANTLED FROM (SEE PLATE 20 OPER. 128) THIS IS VERY IMPORTANT.

BEGIN AT RIGHT - PLACE SELECTING ARM YOKE ENDS UNDER SELECTING GEAR SHAFT AGAINST SELECTING GEAR AT 'L' BRING ARM DOWN TO ENGAGE STUDS AND 'N'

### - NOTE -

THESE ARMS ARE NUMBERED FROM 1 TO 8 AND MACHINE SHOULD HAVE BEEN ASSEMBLED THUS. HOWEVER SUCH MAY NOT BE THE CASE THEREFORE PRACTICALLY IGNORE THE STAMPED NUMBERS WHEN THEY CONFLICT WITH THE SEQUENCE YOU DISMANTLED THEM. THE POINT IS PUT ARMS BACK TO WHERE THEY CAME FROM THEY HAVE BEEN ADJUSTED TO THAT COLUMN AND NONE OTHER

NOTE THAT THE OVERHANG OF THE STRAP MUST BE ON INSIDE TOWARD ARMS



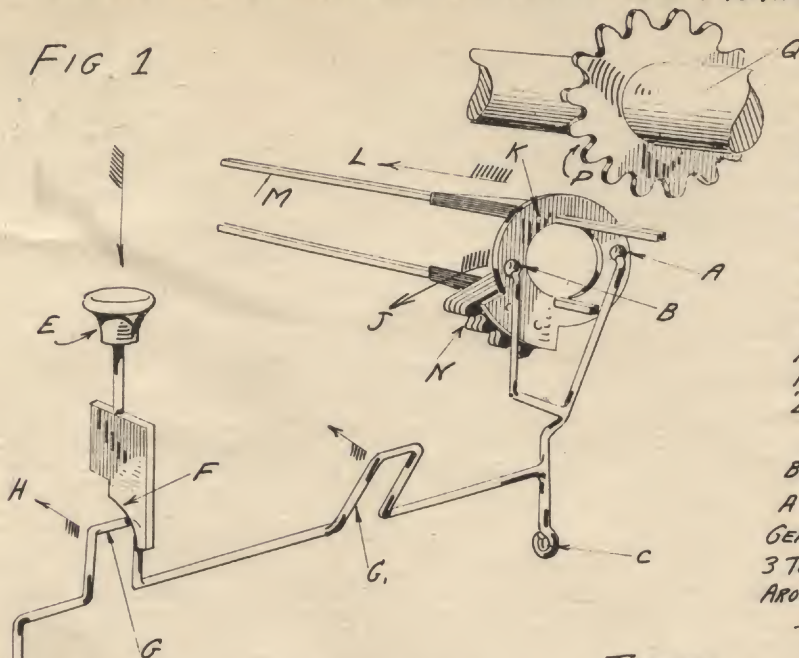
348

ASSEMBLE THE RESTRAINING STRIP 'P' ON SPACE BAR. USE SCREWS 'Q' AND TIGHTEN.



## THEORY AND PRACTICE REGARDING THE MONROE KEYBOARD ALIGNMENT.

FIG 1



### - THE PRINCIPLE -

A YOKE OF WHICH POINTS A AND B ARE THE WORKING POINTS IS FULCRUMED AT C AND D - UPON DEPRESSING KEY E DOWNWARD CAM SURFACE F ACTS AGAINST LUG G AND THROWS LUG H (AS WELL AS POINTS G AND A-B) IN DIRECTION OF ARROW J. POINTS A-B THEREFORE MUST MOVE SELECTING GEAR K IN DIRECTION OF ARROW L - THIS MOVEMENT BEING ALONG TRACKS (KEYWAYS) M.

LUGS G AND G' ARE BENT AT DIFFERENT ANGLES ALLOWING DIFFERENT DISTANCES OF THROW - THAT FACT DETERMINES HOW FAR IN DIRECTION OF ARROW L THE SELECTING GEAR K IS PUSHED BY THE YOKE.

SECTOR Y CONTAINS GEAR TEETH ARRANGED IN BLADES ONE BLADE CONTAINS 4 TEETH THE OTHERS 3-2-1 A CERTAIN PUSH OF THE YOKE WILL PLACE THE 3 TOOTHED GEAR IN LINE SO THAT WHEN SHAFT IS REVOLVED THOSE 3 TEETH WILL ENGAGE INT. GEAR P AND DRIVE THE DIALS AROUND 3 PLACES RESPECTIVELY.

- THE FIVE TOOTHED ACTION IS EXACTLY THE SAME -

### - THEORY -

IN THEORY NO TROUBLE NEED BE OCCASIONED BY THIS CONSTRUCTION - IT IS TAKEN FOR GRANTED THAT LINES a-b IS STRAIGHT. SO ALSO ARE LINES c-d-e-f VERTICAL AND g-h-j-k AT THE PROPER ANGLE - THEN ALSO POINTS l AND m ARE IN LINE AND STRAIGHT - TOUCHING SELECTING GEAR AT THE SAME TIME. LINE m-n IS AT PROPER ANGLE. SO ALSO ARE LINES p-q AND ANGLES e-s.

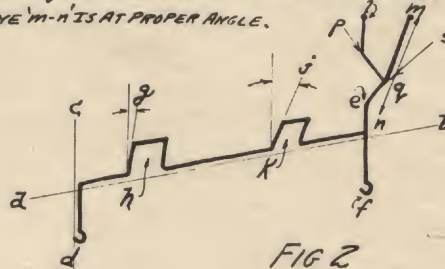


FIG 2

### - PRACTICE -

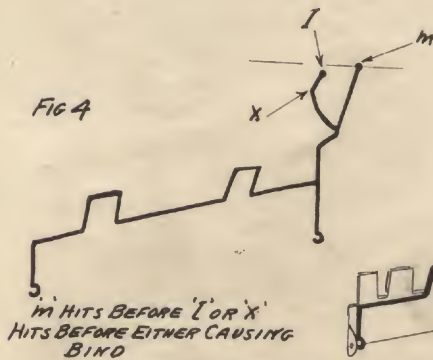


FIG 4

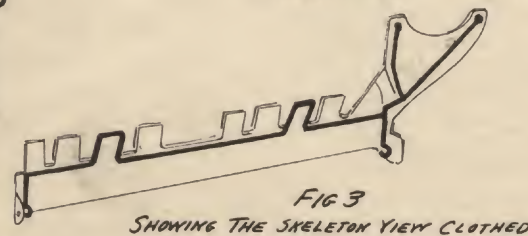


FIG 3

SHOWING THE SKELETON VIEW CLOTHED

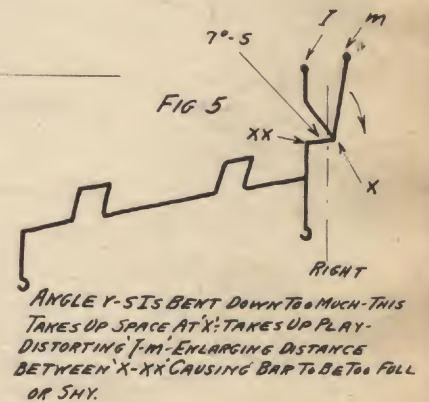


FIG 5

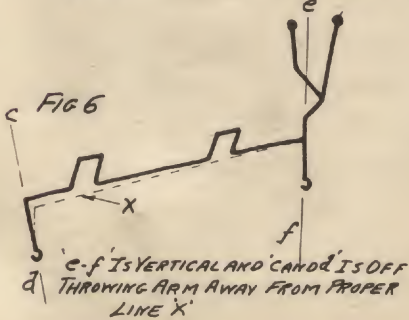


FIG 6

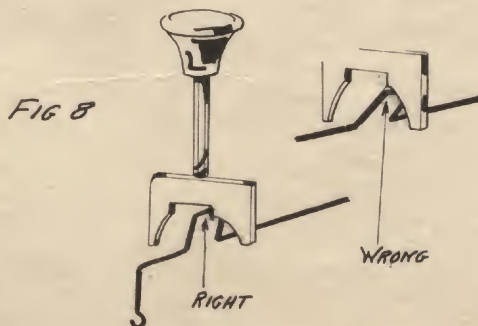


FIG 8

SHOWING PROPER PLACE OF LUG IN KEY STEM SLOT.

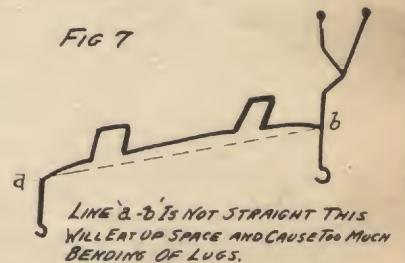
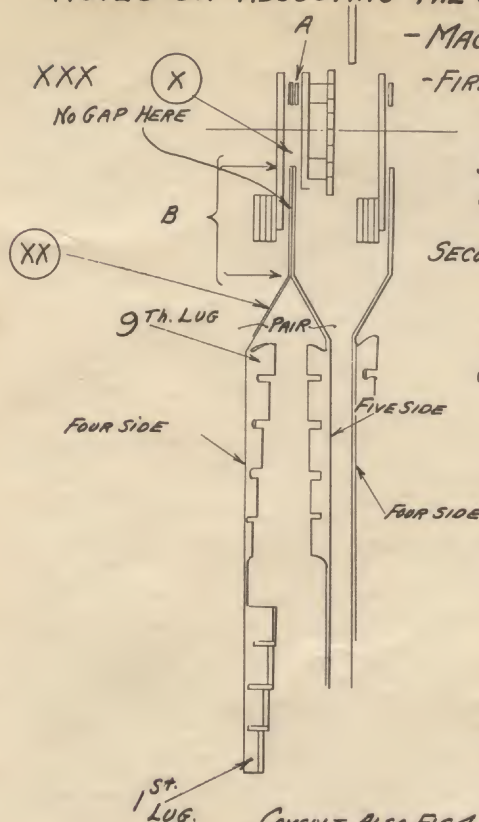


FIG 7



# NOTES ON ADJUSTING THE SELECTING ARMS.



- MACHINE MUST BE IN NEUTRAL POSITION -

- FIRST - GRASP THE INSERTED ARMS IN FINGERS AND PRESS THEM TOGETHER PAIR BY PAIR (ONE ARM OF EACH COLUMN) WHEN HELD TOGETHER THERE SHOULD BE PLAY AT 'X' BETWEEN SELECTING GEARS AND AS AN IDEAL CONDITION THE FACES OF YOKE SHOULD BE FLUSH THE ENTIRE LENGTH OF 'B'

SECOND - EQUALIZE THE THROW OF THE YOKE.

SELECTING GEAR TRAVELS ON TWO KEYS (SEE FIG 1 PLATE 53) THESE KEYS ARE NARROW AND THE KEYWAY COMPARATIVELY SHORT THEREFORE EASILY SUBJECT TO A BIND CAUSED BY HEAVIER OR UNEVEN APPLICATION FROM ONE OF THE POINTS 'A'-'B' (FIG 1 PLATE 53) OF THE YOKE THIS PRESSURE MUST THEREFORE BE EQUALIZED.

THIS IS DONE BY BENDING THE YOKE POINTS 'A' OR 'B' WITH TOOL #2

TEST ARM AT NINTH LUG WITH FINGER - SLIDE SELECTING GEAR WITH ARM YOKE - IF IT BINDS BEND POINTS UNTIL IT SLIDES FREELY (THE POINT NEEDING BENDING MAY OFTEN BE DETERMINED BY A SLIGHT PRESSURE BEING EXERTED AND ONE OF THE LUGS TAPPED WITH A SCREW DRIVER

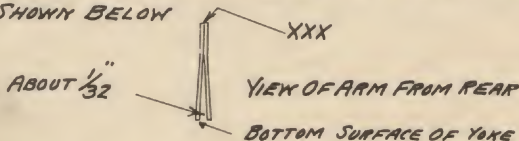
- IT FOLLOWS THAT IF GEAR SLIDES FREE THAT MORE PRESSURE ON THE LUG TAPPED IS NEEDED - IMPORTANT - AFTER TESTING AT 9TH LUG - TEST ARM AGAIN AT 1ST LUG - A SLIGHT FURTHER ADJUSTMENT WILL BE NEEDED TO COMPENSATE FOR THE WHIP IN THE LONGER METAL NOW BEING BROUGHT INTO PLAY - IN FACT IT WILL BE NOTED THAT AFTER ADJUSTMENT HAS BEEN AFFECTED THAT POINT 'A' OF YOKE TOUCHES GEAR SLIGHTLY SOONER THAN POINT 'B'

- THE 5 SIDE IS TESTED THE SAME WAY -

CONSULT ALSO FIG 4 PLATE 53 - IT SOMETIMES HAPPENS THAT POINTS OF YOKE DO NOT TOUCH BUT THE SIDE OF THE YOKE HITS THE SELECTING GEAR AT 'X' THIS WILL CAUSE A BIND - REMEDY IT BY BENDING SO THAT POINTS 'A'-'B' ALONE TOUCH THE SELECTING GEAR AND CAUSE IT TO SLIDE.

- REGARDING PLAY AT 'X'

LACK OF PLAY AT 'X' IS CAUSED BY THE FACT THAT ANGLE 'C-S' (FIG 2 PLATE 53) IS NOT RIGHT - IT HAS BEEN BENT DOWN TOO FAR (SEE FIG 5 PLATE 53) AND TAKES UP ROOM BEND IT TO ITS PROPER ANGLE WITH TOOL #2 - LACK OF PLAY MAY ALSO BE CAUSED BY BENDS AT POINT 'A'-'B' (FIG 1 PLATE 53) THESE POINTS SHOULD BE STRAIGHT TO ACQUIRE BEST PLAY. PLAY MAY ALSO BE TAKEN AWAY IF THE BOTTOM SURFACE OF THE YOKE TOUCHES - LEAVING A GAP AT THE TOP AT 'XXX' THE IDEAL CONDITION IS SHOWN BELOW



— NOTE —

CENTRALIZING THE ARMS - WHICH IS WHAT IS MEANT BY 'PLAY' AT 'X' IF CAREFULLY DONE WILL PROVE A GREAT AID IN FURTHER ALIGNMENT - AND IS THE BASIS OF MANY TROUBLES IF NOT PROPERLY DONE.

FURTHER TESTING AND ALIGNMENT MUST BE DONE WITH THE AID OF AN ASSEMBLED KEYBOARD

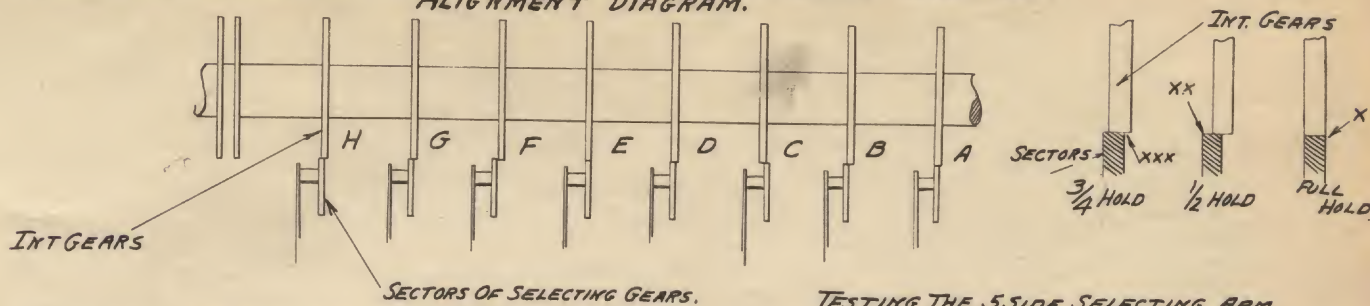
KEYBOARD IS PLACED UPON MACHINE AND THE HOLDING SCREWS TIGHTENED SECURELY.

(DO NOT TIGHTEN THE SCREWS OF ONE SIDE THEN THE OTHER BUT EQUALIZE THE TIGHTENING - THIS WILL PREVENT DISTORTION OF THE KEY BOARD)

IT IS GOOD PRACTICE WHEN THE KEYBOARD IS ON TO DEPRESS ALL OF THE NINES - WITH AN ADDITION 'TURN' - TURN CRANK UNTIL THE SECTOR OF THE SELECTING GEARS ENGAGE THE INT GEAR WITH 5 SIDE OF NINES. (FOR FURTHER ADJUSTMENT NOTES SEE PLATE 55)



## NOTES ON ADJUSTING SELECTING ARMS AND KEYBOARD ALIGNMENT ALIGNMENT DIAGRAM.

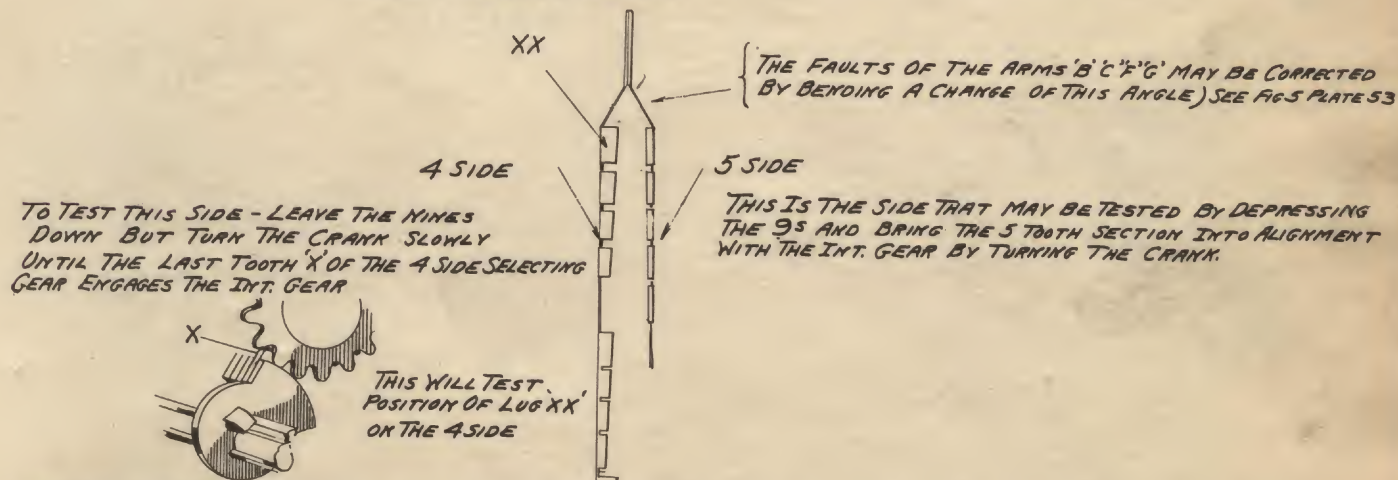


IT IS OF COURSE BEST PRACTICE TO WORK UPON ONE COLUMN AT A TIME - BUT THE REASON THE WHOLE EIGHT KEYS WERE DEPRESSED IN PLATE 54 WAS TO PRESENT A GENERAL SURVEY AND DETERMINE WHICH OF THE ARMS ARE TO BE REBENT AND EQUALIZED. AND TO DO THIS TO MORE THAN ONE AT A TIME IF NEED BE WHILE THE KEY BOARD IS OFF.

WE ARE HEREBY ADJUSTING WHAT IS CALLED THE  $\frac{3}{4}$  HOLD SHOWN ABOVE  
A  $\frac{3}{4}$  HOLD IS SUFFICIENT AND ALLOWS SPACE AT 'xxx' - A  $\frac{1}{2}$  HOLD OVERHANGS TOO MUCH AT 'xx' AND HOLD ITSELF IS WEAK  
A FULL HOLD HAS NO CLEARANCE AT 'x' AND IS THEREFORE TOO PRECARIOUS.

A  $\frac{1}{2}$  HOLD OR LESS DEMANDS A BEND OF THE ADJUSTING ARM YAKE (IT CAN NOT BE ADJUSTED WITH THE LUGS)

IN THE ABOVE DIAGRAM - ARMS 'B' 'C' 'F' 'G' MUST BE NOTED FOR REBENDING WHEN THE KEY BOARD IS TAKEN OFF.



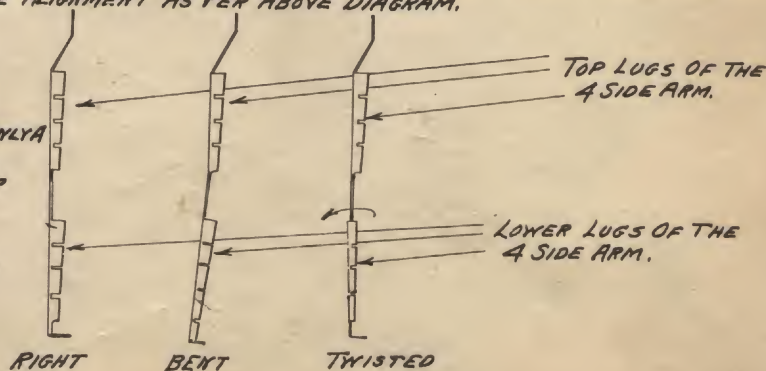
WHEN THE ABOVE ALIGNMENT HAS BEEN BROUGHT ABOUT - DETERMINE WHICH ARM HAS OR HAS NOT THE PROPER  $\frac{3}{4}$  HOLD. NOTE THE ARMS THAT ARE OUT OF ALIGNMENT AND NEED REBENDING.

WHILE THE KEY BOARD IS STILL ON IT IS GOOD PRACTICE TO TEST THE STATE OF THE ARM IN REGARD TO ITS LENGTH - IT SHOULD BE STRAIGHT AS BELOW IT MAY HOWEVER BE BENT OR TWISTED (SEE FIG 6 AND 7 PLATES 53) TO TEST PUT IN THE 4'S ON THE KEYBOARD AND CHECK UP THE ALIGNMENT AS PER ABOVE DIAGRAM.

THE ALIGNMENT SHOULD SHOW UP THE SAME ALIGNMENT AS THE TEST JUST ABOVE THIS

FOR EXAMPLE: IF A BAR ABOVE HAS ONLY A  $\frac{1}{2}$  HOLD WHEN 9 IS DOWN AND THIS TEST SHOWS IT TO HAVE ONLY A  $\frac{1}{4}$  HOLD WHEN 4 IS DOWN THERE IS A BEND OR A TWIST BETWEEN THE TOP GROUP OF LUGS AND THE LOWER GROUP OF LUGS.

FOR BENDING INSTRUCTIONS TO OVER COME THE FAULTS OF THESE THREE PRELIMINARY TESTS CONSULT PLATE 56





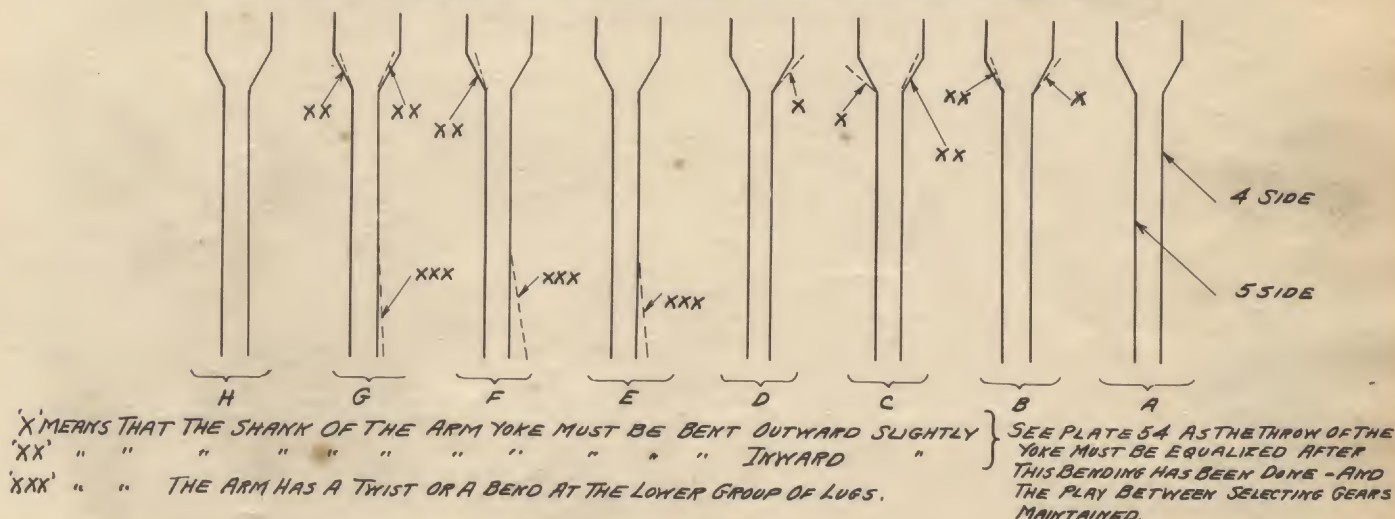
# X PLATE 56 ADJUSTMENT INSTRUCTIONS FOR SELECTING ARMS FOLLOWING THE PRELIMINARY TESTS THE INFORMATION THIS TEST GAVE YOU SHOULD HAVE BEEN NOTED DOWN ON A SCRATCH PAD SOMEWHAT ALONG THE LINES AS SHOWN BY SAMPLE BELOW.

	8TH.	7TH.	6TH.	5TH.	4TH.	3RD.	2ND.	1ST.
COLUMN →	H	G	F	E	D	C	B	A
ALIGNMENT TEST OF THE 5 SIDE GROUP OF LUGS. (95 DEPRESSED)	O.K.	$\bar{1}/2$	$\bar{3}/4$	O.K.	O.K.	$+1/2$	$\bar{1}/4$	O.K.
ALIGNMENT TEST OF THE TOP GROUP OF THE 4 SIDE LUGS (95 DEPRESSED)	O.K.	$\bar{1}/2$	O.K.	O.K.	$+1/4$	$\bar{1}/4$	$+1/4$	O.K.
ALIGNMENT TEST OF THE LOWER GROUP OF THE 4 SIDE LUGS (WITH 45 DEPRESSED)	O.K.	$\bar{3}/4$	$\bar{1}/2$	$\bar{1}/4$	$+1/4$	$\bar{1}/4$	$+1/4$	O.K.

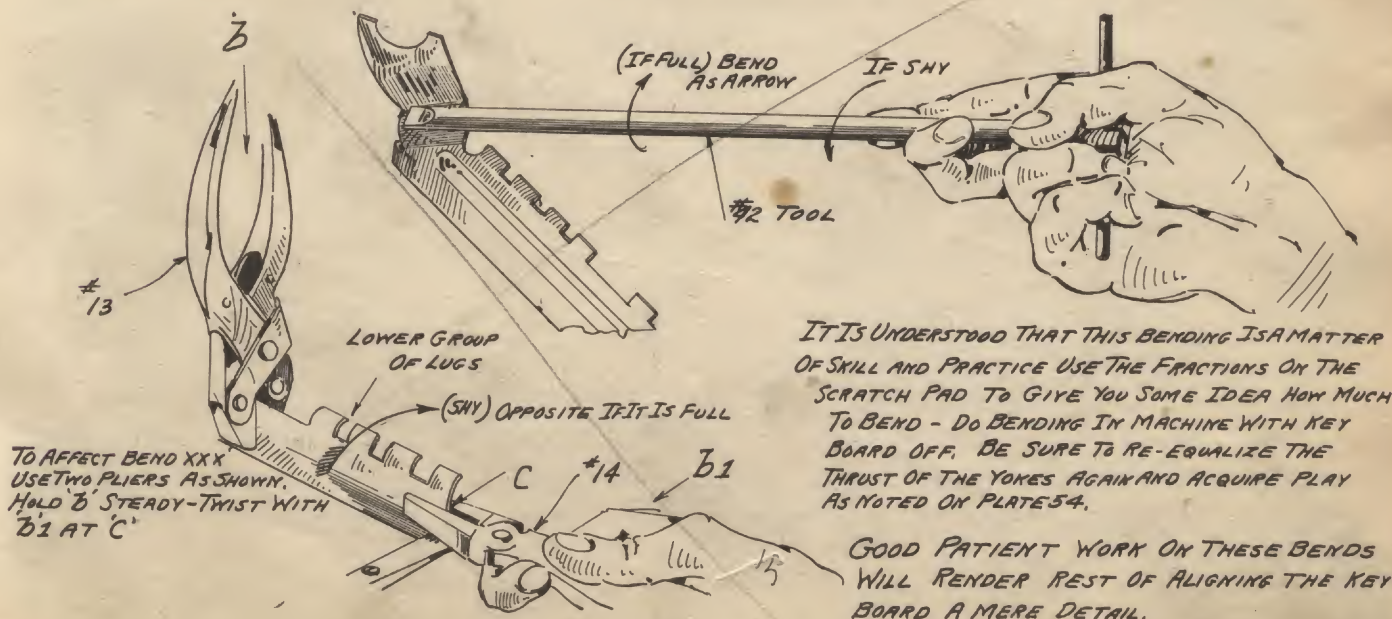
RIGHT SIDE OF MACHINE  
 - (SHY) MEANS YOU HAVE LESS THAN  $3/4$  HOLD  
 + (FULL) MEANS YOU HAVE MORE THAN  $3/4$  HOLD.  
 $3/4$  HOLD IS O.K.

THE FRACTIONAL NOTES ( $1/4$ ) WILL GIVE YOU SOME IDEA HOW MUCH BAR IS OFF.

THE FAULTS NOTED ON THE SCRATCH PAD ARE SKETCHED BELOW.



TO AFFECT BEND X AND XX USE TOOL #42 AS BELOW



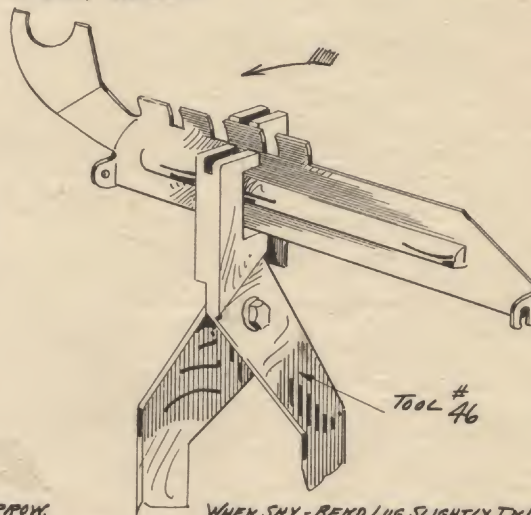
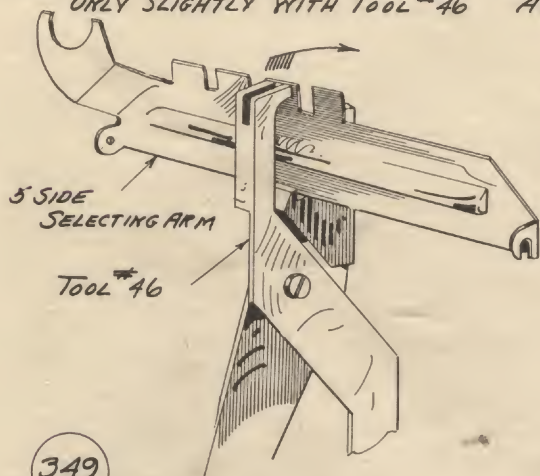


# NOTE ON DETAILED KEYBOARD ADJUSTMENT

THE PRIMARY LINING UP HAVING BEEN DONE FOLLOWING THE PRELIMINARY TESTS (SEE PLATE 55-56) THE CLAMPING STRIP SHOULD BE TAKEN OFF AND THE 4 SIDE SELECTING ARMS SHOULD BE TAKEN OUT - LEAVING ONLY THE 5 SIDE ARMS IN THE MACHINE - REPLACE THE CLAMPING STRIP AND PUT ON THE KEYBOARD SECURELY WITH THE REGULAR SCREWS TIGHTLY IN PLACE.

PROCEED TO TEST ONE COLUMN AT A TIME FROM THE 9s TO THE 5s - AND ASCERTAIN THAT EACH KEY INDIVIDUALLY ALIGNS THE SELECTING GEAR WITH THE INT. GEAR AT A  $\frac{3}{4}$  HOLD.

IF ANY KEY IS FOUND TO ALIGN WRONGLY IT SHOULD RECEIVE ATTENTION AND BE ADJUSTED BEFORE ANOTHER KEY IS TESTED. THIS ADJUSTMENT MAY BE AFFECTED BY BENDING THE LUG BUT ONLY SLIGHTLY WITH TOOL #46 AS SHOWN BELOW

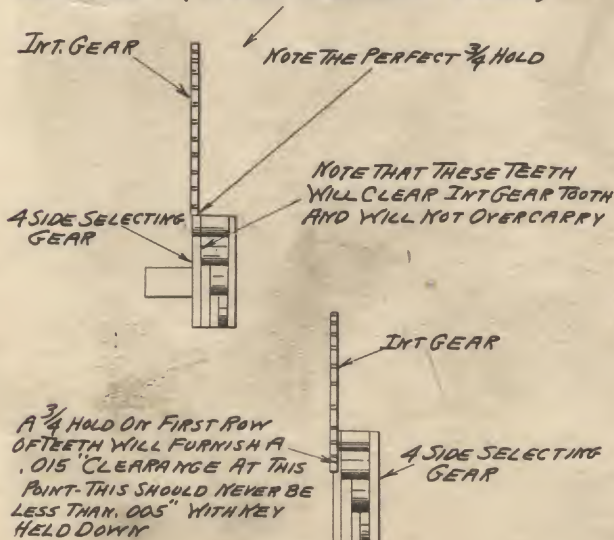


WHEN FULL-BEND LUG SLIGHTLY IN DIRECTION OF ARROW.

WHEN ALL OF THE 5 SIDE LUGS HAVE BEEN ALIGNED PROPERLY WITH THIS TOOL - REMOVE ALL OF THE 5 SIDE ARMS AND INSERT ALL THE 4 SIDE ARMS AND PROCEED TO TEST AND ADJUST AS ABOVE.

- IMPORTANT - EACH LUG MUST ENTER THE SLOT OF THE KEY (SEE FIG 8 PLATE 53) THIS IS NOT POSSIBLE IF THE LUG WAS BENT TOO MUCH - WHEN BUT A SLIGHT BENDING WILL NOT DO THE ADJUSTMENT SHOWN ON PLATE 56 MUST AGAIN BE MADE.

WHEN ALL 4 SIDE LUGS HAVE BEEN PROPERLY ADJUSTED INSERT THE 5 SIDE ARMS AND FASTEN IN THE KEY BOARD WITH SCREWS SECURELY. IT IS GOOD PRACTICE NOW TO GIVE THE ENTIRE KEYBOARD A FINAL CHECKING TEST. DEPRESS AND WATCH THE ALIGNMENT OF EACH KEY ESPECIALLY THE 4 TOOTHED SELECTING GEAR WHEN IT COMPOSES AN 8-7-6-3-2-1 BECAUSE YOUR ALIGNMENT MUST BE CORRECT ENOUGH. SO THAT THE SELECTING GEAR TOOTH OR TEETH THAT ARE NOT WORKING WILL NOT TOUCH THE INT. GEAR AND CAUSE AN OVERCARRY (STUDY SKETCHES BELOW)

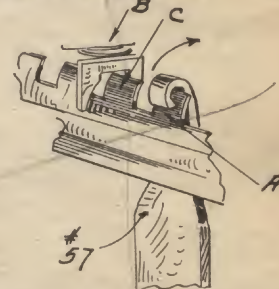


- NOTE - TO AFFECT THIS FINAL SLIGHT ADJUSTMENT OF THE LUGS WHILE THE KEY BOARD IS ON AND ALL THE SELECTING ARMS IN PLACE WE ADVOCATE THE METHOD BELOW AND SUPPLY THE NECESSARY TOOLS

INSERT PAIR OF DUCK BILL PLIERS BETWEEN ARMS FROM UNDERNEATH PUSH UP UNTIL ONE PRONG IS AT LUG AND THE OTHER THE SIDE OF THE KEY AT 'X'

BE SURE THAT LUG IS RESTING AGAINST SIDE OF NOTCH AS AT 'XX' (KEY IS DEPRESSED)

WHEN PLIERS ARE PROPERLY PLACED SQUEEZE SLIGHTLY AND YOU WILL GET A HOLD WHICH WILL BE LESS.

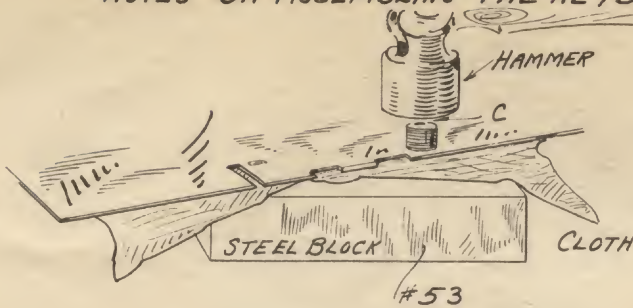


WHEN LUG 'A' IS TO BE ADJUSTED - PUSH DOWN THE KEY 'B' ABOVE IT - THIS WILL KEEP ARM AT LUG 'C' FROM DISTORTING WHILE BENDING LUG 'A' IN DIRECTION OF ARROW WITH TOOL #57 FOR A FULLER HOLD

DO THIS TO REMEDY A FULL HOLD - THIS FOR SHY HOLD.

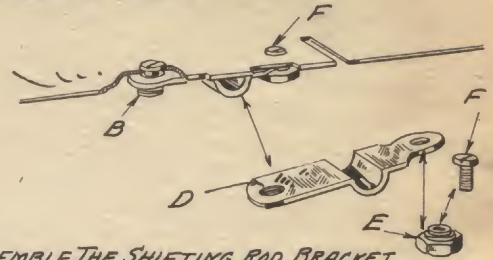


## NOTES ON ASSEMBLING THE KEYBOARD



360

ASSEMBLE THE ADJUSTING SCREW. ASSEMBLE 'A' INTO 'B' AND HEAD OVER WITH A HAMMER AS SHOWN

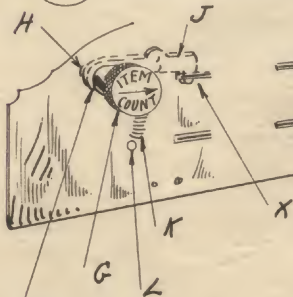


361

ASSEMBLE THE SHIFTING ROD BRACKET. BRACKET IS THREADED AT 'D'. SCREW ADJUSTING SCREW 'B' INTO THIS HOLE. PLACE NUT 'E' IN HOLE SHOWN AND INSERT SCREW 'F' TIGHTLY.

362

ASSEMBLING THE ITEM COUNTER KNOB AND LATCH



RIVET THE KNOB 'G' INTO LATCH 'J' SLIGHTLY. PLACE LATCH INTO POSITION SHOWN AT 'X'. TURN KNOB UNTIL ARROW POINTS TO CENTER OF KEY SLOT 'X'. THEN RIVET SAME AT 'H'. DO NOT RIVET DOWN TOO HARD - THE LATCH SHOULD HAVE NO PLAY BUT IT MUST BE FREE TO MOVE WITHOUT FRICTION. HOOK SPRING 'K' TO STUD 'L'.

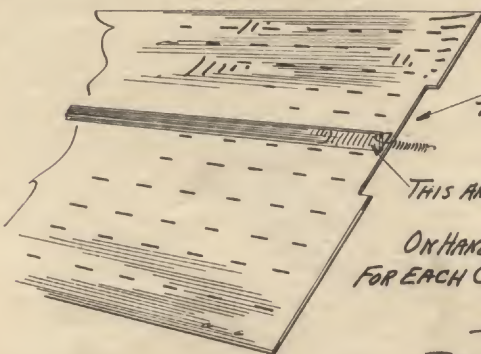
AS SPRING IS HOOKED ON SEE THAT LATCH IS MOVED OUT OF WAY AND KNOB ARROW POINTS AS SHOWN.



OIL

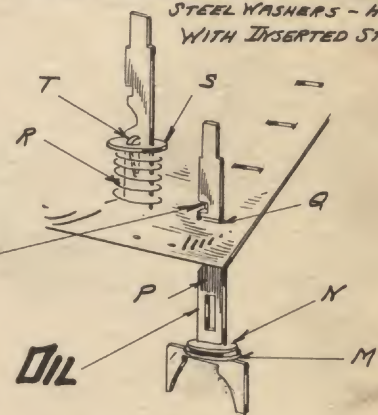
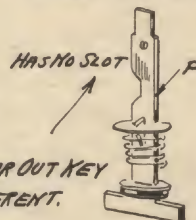
363

ASSEMBLE THE KEY STEM INTO THE BOTTOM PLATE



ON HAND MACH. THE CLEAR OUT KEY FOR EACH COLUMN IS DIFFERENT.

—IMPORTANT NOTE—  
THIS SLOTS MUST FACE THE LEFT



STEEL WASHERS - HOLD PARTS WITH INSERTED STOP 'T'.

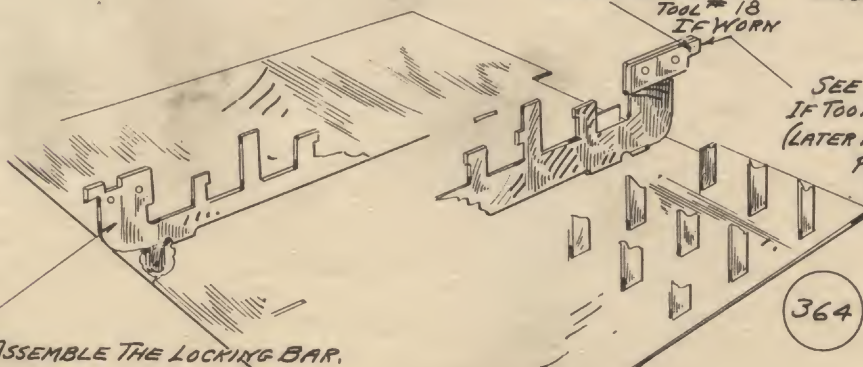
OIL

—NOTE—

SEE THAT THIS POINT IS NOT WORN. IF TOO MUCH WORN INSTALL NEW PART. (LATER MACHINES ARE REINFORCED AT THIS POINT) PEENING MAY ALSO BE USED ELONGATE AND MAKE UP FOR WEAR.

365

ASSEMBLE THE LOCKING BAR.



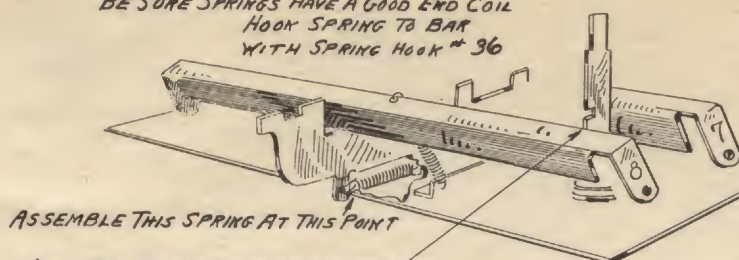
364

ASSEMBLE THE CLEARING BAR.



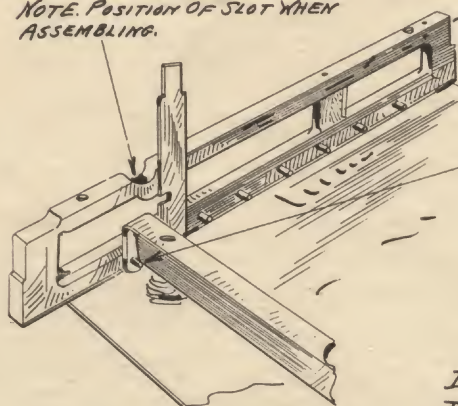
NOTES ON ASSEMBLING THE KEYBOARD (CONTINUED)

BE SURE SPRINGS HAVE A GOOD END COIL  
HOOK SPRING TO BAR  
WITH SPRING HOOK # 36



LOOK FOR EXCESSIVE WEAR WHERE  
THE KEY TOUCHES.

NOTE. POSITION OF SLOT WHEN  
ASSEMBLING.



366 ASSEMBLE THE KEY STEM LOCKING  
SHUTTERS

THESE SHOULD HAVE BEEN MARKED AS  
SHOWN IN OPER #122 PLATE 19  
ASSEMBLE THEM IN THE SAME LOCATION.

367 ASSEMBLE THE REAR KEYBOARD CASTING  
TIGHTEN THE FOUR SCREWS SECURELY.

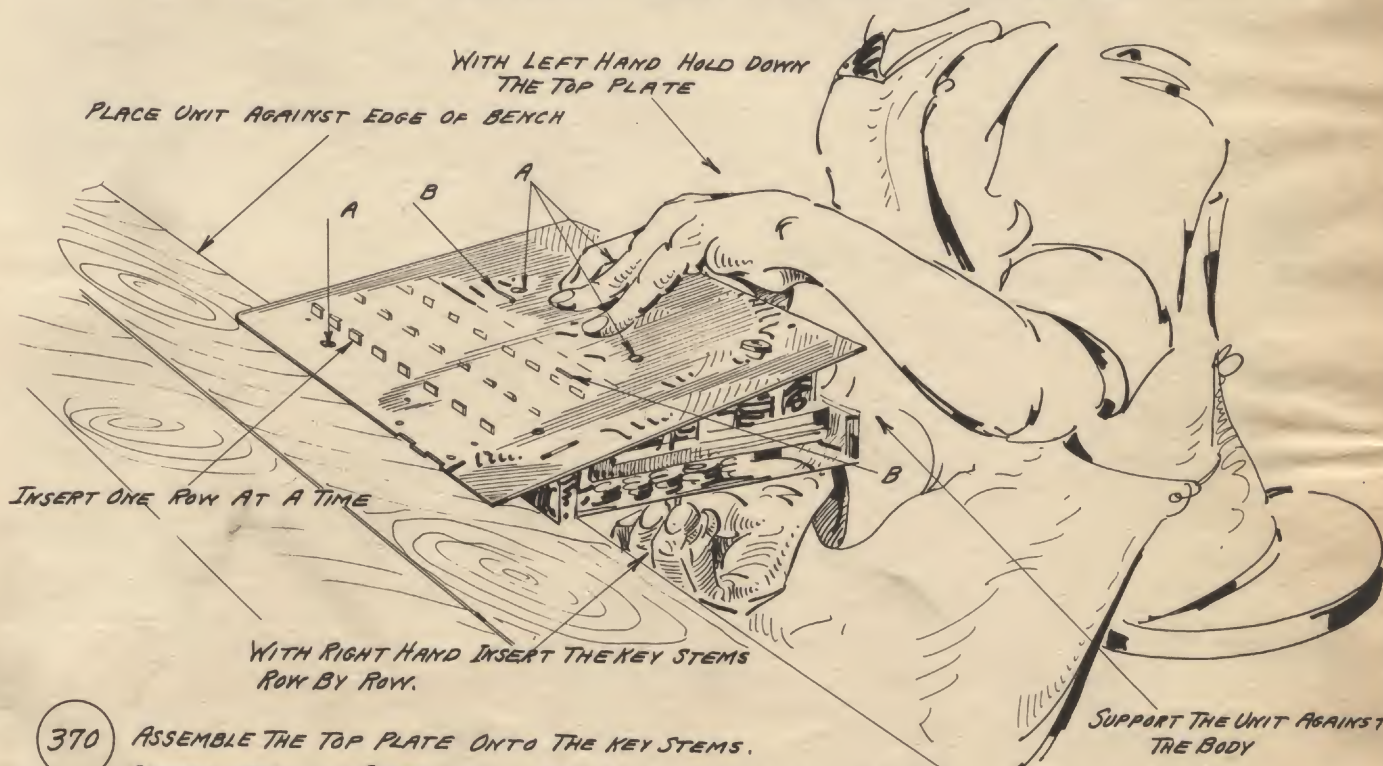
368 PLACE THE LOCKING SHUTTERS ON PINS

369 ASSEMBLE THE FRONT KEYBOARD  
CASTING WHILE PLACING SHUTTERS  
ON PIVOT PINS. TIGHTEN SCREWS  
SECURELY.

IT IS GOOD PRACTICE TO TEST THE SHUTTERS AT THIS POINT - SEE THAT  
THEY MOVE FREELY AND THAT ALL SHUTTERS ARE ON THE PIVOT PINS.

WITH BRUSH PAINT THE EDGES OF THE SHUTTERS SLIGHTLY WITH GREASE.

WITH LEFT HAND HOLD DOWN  
THE TOP PLATE  
PLACE UNIT AGAINST EDGE OF BENCH

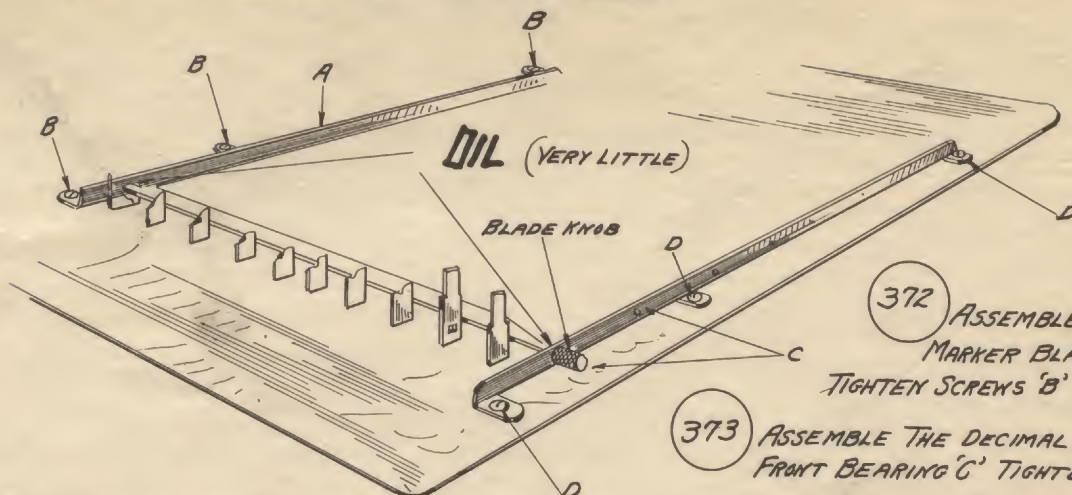


370 ASSEMBLE THE TOP PLATE ONTO THE KEY STEMS.

BEFORE PRESSING ENTIRELY DOWN SEE THAT LOCKING AND CLEARING  
BARS ARE IN THEIR RESPECTIVE SLOTS 'B'

371 ASSEMBLE THE 4 HOLDING SCREWS 'A' TIGHTLY AND TEST THE CLEARING BAR FOR FREEDOM OF  
MOVEMENT.



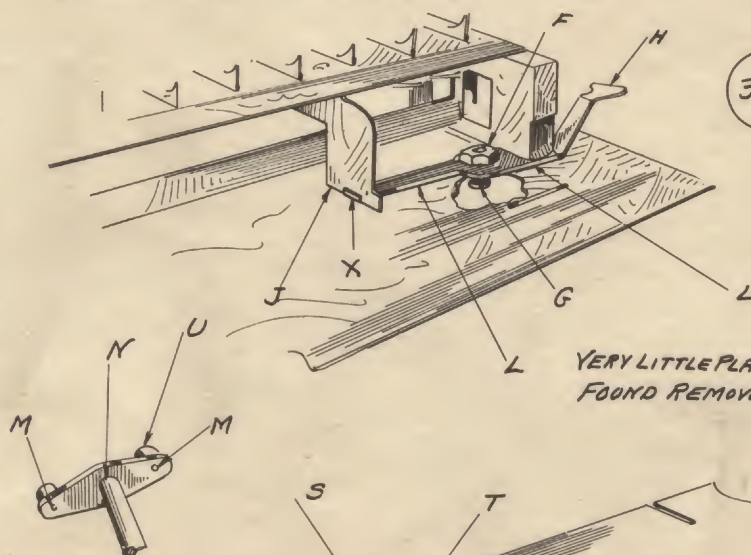


372 ASSEMBLE THE REAR DECIMAL MARKER BLADE BEARING 'A' TIGHTEN SCREWS 'B' SECURELY.

373 ASSEMBLE THE DECIMAL MARKER BLADES AND FRONT BEARING 'C' TIGHTEN SCREWS 'D' SECURELY.

TEST THE BLADE KNOBS TO ASCERTAIN THAT THEY FUNCTION FREELY.

IT IS GOOD PRACTICE AT THIS POINT TO TEST ALL THE KEYS TO SEE THAT THEY MOVE FREELY AND LOCK. IF KEY STICKS THE KEY STEM MAY BE SLIGHTLY BENT AT BOTTOM OR ENAMEL MAY INTERFERE IN SLOT OF TOP KEYBOARD PLATE IF KEY DOES NOT LOCK - INSPECT THE LOCK BAR - IT MAY BE OFF THE STUD - WORN WHERE KEY ENGAGES OR TWISTED IN ITS LENGTH.



374 ASSEMBLE THE KEY BOARD LOCK BAR LEVER PLACE COLLAR 'F' INTO LEVER 'H' INSERT END OF LEVER 'H' INTO SLOT OF BAR 'J' AT 'X' PLACE COLLAR 'F' INTO HOLE IN TOP PLATE AND ASSEMBLE SCREW 'G' SECURELY.

- ADJUSTMENT NOTE -

LEVER MUST MOVE FREELY BUT MUST HAVE VERY LITTLE PLAY AT 'L'

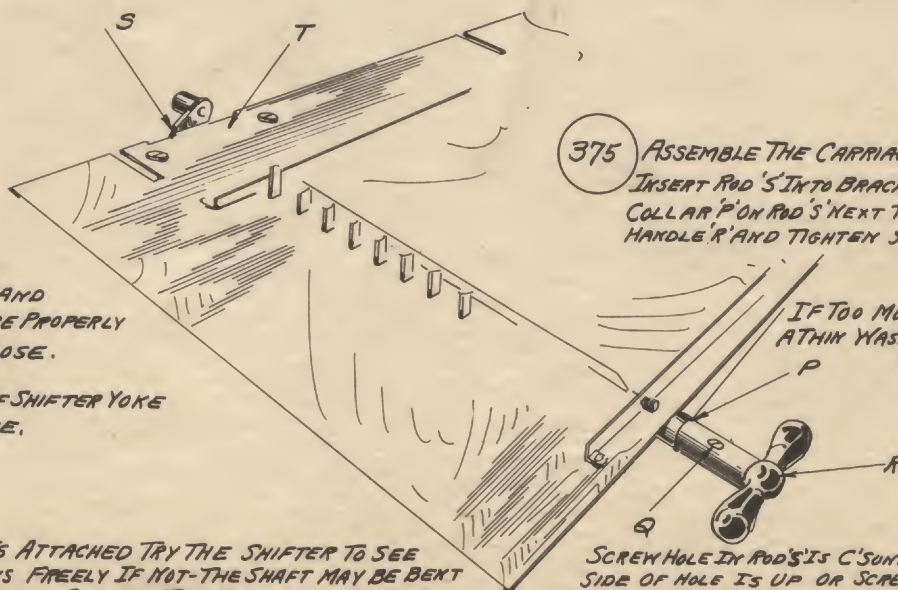
VERY LITTLE PLAY IS ALSO ALLOWED AT 'X' IF TOO MUCH PLAY IS FOUND REMOVE THE LEVER AND REMEDY THESE POINTS.

- REPAIR NOTE -

SEE THAT STUDS 'M' AND END OF ROD AT 'N' ARE PROPERLY RIVETED AND NOT LOOSE.

SEE THAT ROLLERS OF SHIFTER YOKE ARE FREE TO REVOLVE.

WHEN HANDLE IS ATTACHED TRY THE SHIFTER TO SEE THAT IT FUNCTIONS FREELY IF NOT - THE SHAFT MAY BE BENT OR COLLAR 'P' TOO LONG - REMEDY THESE FAULTS.



375 ASSEMBLE THE CARRIAGE SHIFTER ROD INSERT ROD 'S' INTO BRACKET AT 'T' PLACE COLLAR 'P' ON ROD 'S' NEXT TO PLATE INSERT HANDLE 'R' AND TIGHTEN SCREW 'Q'.

IF TOO MUCH END PLAY - INSTALL A THIN WASHER HERE TO TAKE IT UP.

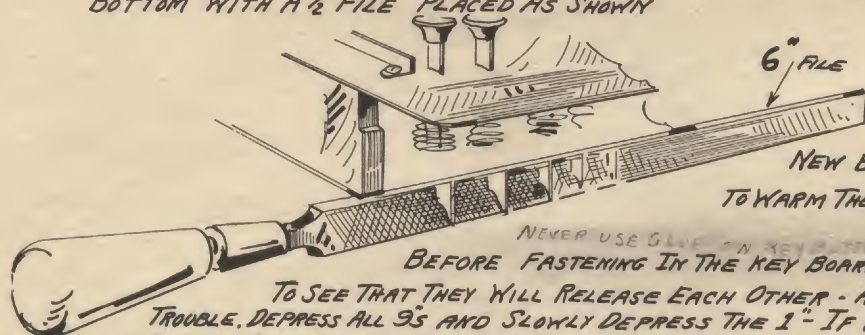
SCREW HOLE IN ROD 'S' IS C' SUNK - SEE THAT THIS SIDE OF HOLE IS UP OR SCREW WILL NOT ENTIRELY ENTER.



# NOTES ON ASSEMBLING THE KEYBOARD.

PLATE 61

- 376 ASSEMBLE THE BUTTONS UPON THE KEY STEMS. - THIS IS DONE BY FIRST PLACING THE BUTTONS UPON THE STEMS WITH THE FINGERS AS FAR AS POSSIBLE THEN TAPPING THEM DOWN WITH A PIECE OF WOOD AND A HAMMER - ONE AT A TIME - BEFORE USING HAMMER SUPPORT THE KEYS AT THE BOTTOM WITH A  $\frac{1}{2}$ " FILE PLACED AS SHOWN



- IMPORTANT NOTE -

NEW BUTTONS SHOULD BE DROPPED INTO HOT WATER TO WARM THEM OR THEY WILL CRACK WHEN PUTTING ON.

NEVER USE GLUE ON KEY BUTTONS IT CAUSES THEM TO STICK WHEN REMOVING. BEFORE FASTENING IN THE KEY BOARD IT IS GOOD PRACTICE TO TEST ALL KEYS TO SEE THAT THEY WILL RELEASE EACH OTHER - A TWISTED OR BENT SHUTTER MAY CAUSE TROUBLE. DEPRESS ALL 9'S AND SLOWLY DEPRESS THE 1" IF DEPRESSING THE 1" WILL NOT RESTORE THE 9 THE SHUTTER IS BENT OR WORN AND NEEDS THE PROPER ATTENTION.

NOTICE THAT THE BELL CRANK IS IN FRONT OF AUTOMATIC KICKER AND CLEAROUT LEVER

DO NOT ASSEMBLE BUTTONS FOR F-E-D OR BARS FOR B UNTIL LATER

- 377 A ASSEMBLE THE KEY BOARD INTO THE MACHINE (HAND MACH ASSEMBLED SAME WAY BUT CONTAINS NO B LEVER OR AUTOMATIC RELEASE KICKER)

THERE IS A SCREW LIKE 'A' ON THE OPPOSITE SIDE

PLACE THE KEY BOARD PLATE OVER EACH OF THE STEMS B-C-D-E-F AND INSERT THE SCREWS 'A' (TIGHTEN ALL SCREWS SECURELY) DO NOT FORGET TO INSERT SCREW 'G'

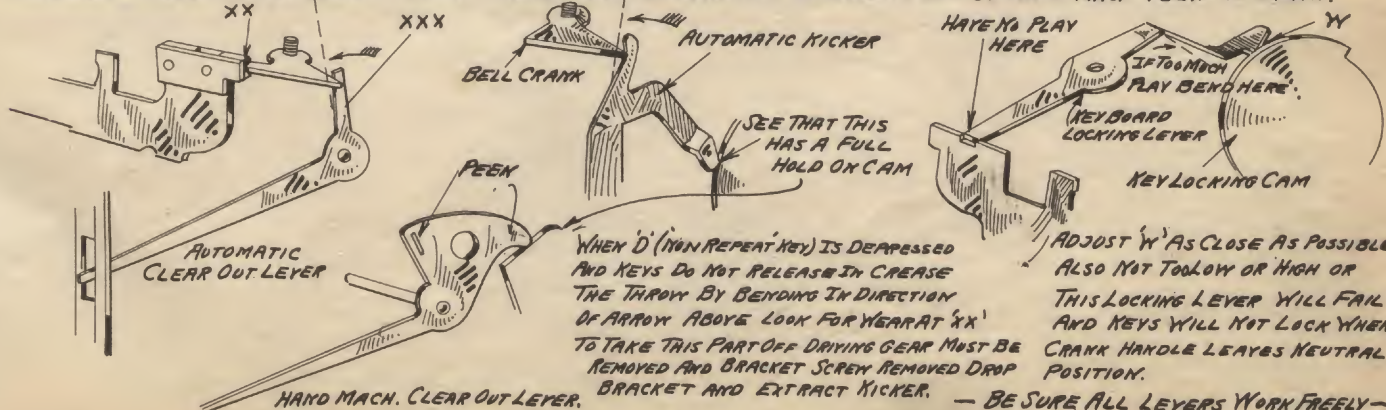
TEST THE LEVERS 'B-B' TO SEE THAT THEY FUNCTION FREELY.

- 378 INSERT THE FRONT R.H. SUPPORTING POST.

THERE IS A SCREW LIKE 'A' ON THE OPPOSITE SIDE

## NOTES - ON TESTING OF KEYBOARD LOCKING LEVER

IF KEYS DO NOT CLEAR WHEN 'F' IS DEPRESSED IT IS BECAUSE EITHER POINT XX IS WORN (SEE OPER 364 PLATE 58) OR THE THROW OF THE LEVER IS NOT ENOUGH - IF NOT - BEND LEVER IN DIRECTION OF ARROW AT 'xxx' ON HAND MACH PEEN AS SHOWN.



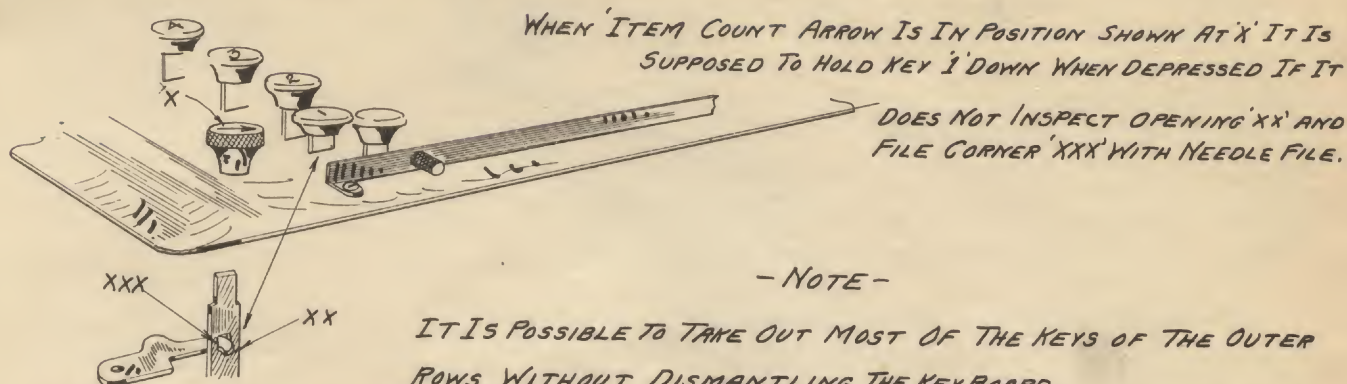
WHEN 'D' (NON REPEAT KEY) IS DEPRESSED AND KEYS DO NOT RELEASE INCREASE THE THROW BY BENDING IN DIRECTION OF ARROW ABOVE LOOK FOR WEAR AT 'xx' TO TAKE THIS PART OFF DRIVING GEAR MUST BE REMOVED AND BRACKET SCREW REMOVED DROP BRACKET AND EXTRACT KICKER.

ADJUST 'W' AS CLOSE AS POSSIBLE ALSO NOT TOO LOW OR HIGH OR THIS LOCKING LEVER WILL FAIL AND KEYS WILL NOT LOCK WHEN CRANK HANDLE LEAVES NEUTRAL POSITION.

- BE SURE ALL LEVERS WORK FREELY -

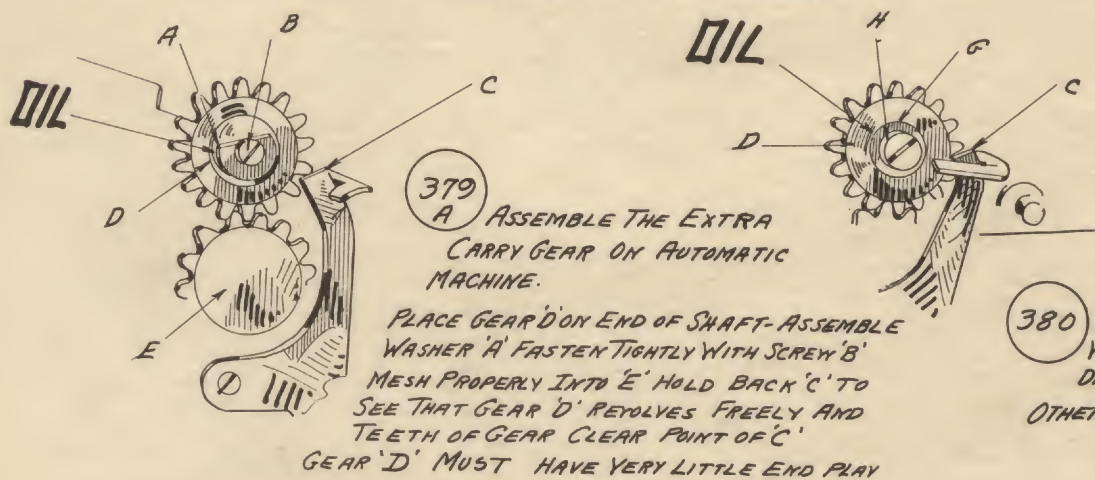


## NOTES ON ASSEMBLING THE KEY BOARD

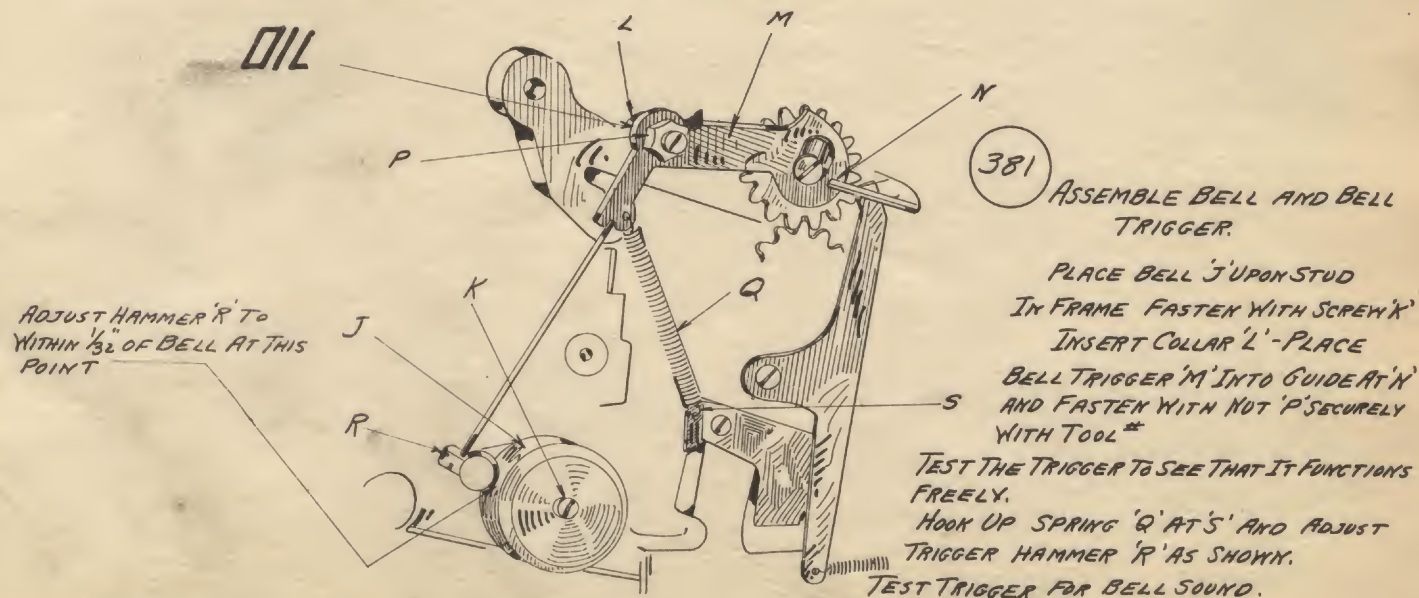


TO REPLACE BROKEN OR BADLY DISTORTED KEYS FROM THE INNER ROWS OF AN ASSEMBLED MACHINE PERFORM OPER # 4-106-111-112-113-114-115-120-121-122-123-124-125-126

## NOTES ON FURTHER ASSEMBLY OF THE MACHINE



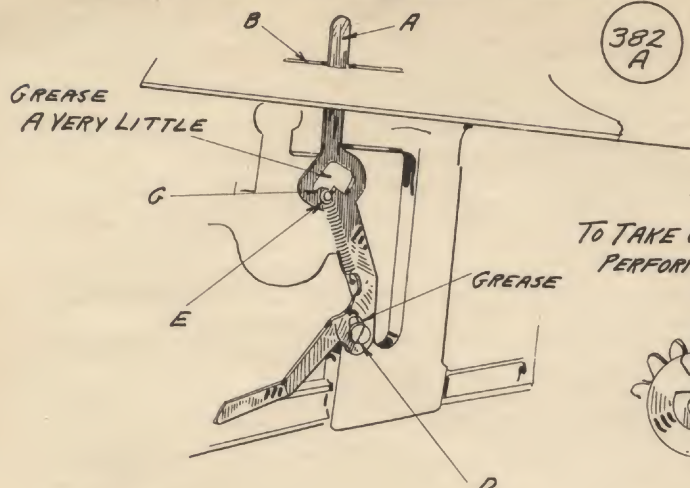
380 ON HAND MACH. THE WASHER 'G' SCREW 'H' ARE DIFFERENT OTHERWISE SAME AS #379 'A'





# NOTES ON ASSEMBLING AUTOMATIC PARTS ON MACHINE.

PLATE 63

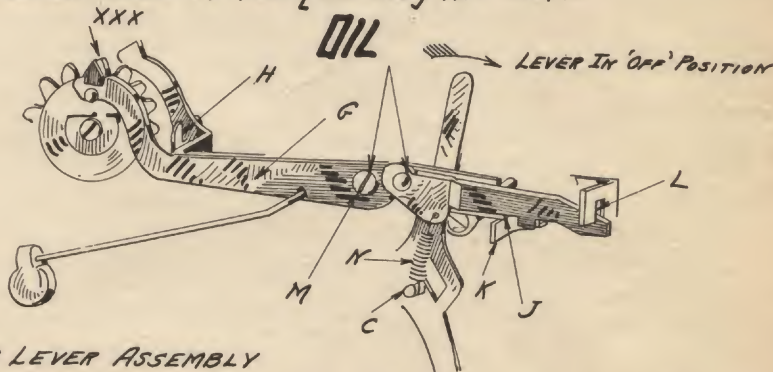


382  
A

## ASSEMBLE THE BELL LEVER.

INSERT LEVER 'A' INTO SLOT 'B' OF KEYBOARD TOP PLATE  
PLACE SLOT AROUND STUD 'C' AND AT LOWER SLOT INSERT  
PIVOT SCREW STUD 'D' - TEST FOR FREEDOM OF MOVEMENT  
THEN HOOK UP SPRING 'E' TO STUD 'C'

TO TAKE ONE OF THESE UNITS FROM AN ASSEMBLED MACHINE  
PERFORM OPER. # 4-106X [L.H. SIDE] 129-197.

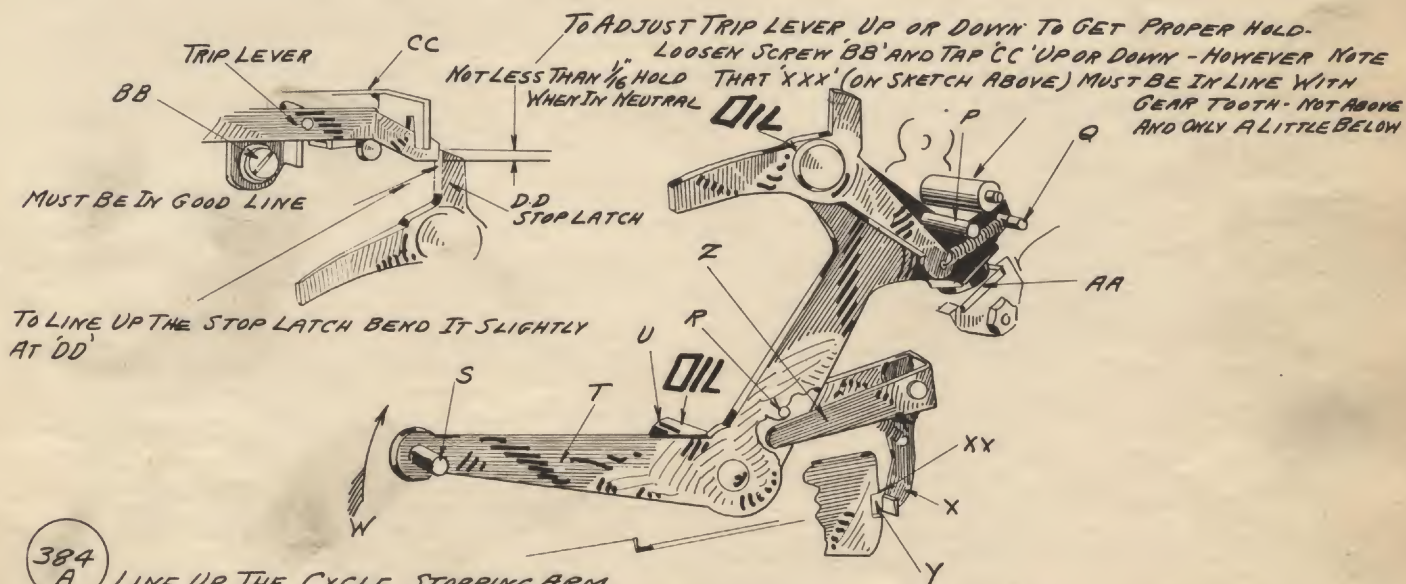


383  
A

## ASSEMBLE THE OVERCARRY TRIP LEVER ASSEMBLY

PLACE LEFT FORK END OF TRIP LEVER 'G' INTO GUIDE SLOT 'H' - SEE THAT END 'J' RESTS ON LUG 'K' - INSERT END OF 'G'  
INTO SLOT AT 'L' - INSERT SCREW 'M' AND FASTEN SECURELY. BEFORE ATTACHING SPRING BE SURE LEVER 'G'  
FUNCTIONS FREELY AND DOES NOT BIND AT 'H' - 'M' - OR 'L' - HOOK SPRING 'N' ON STUD 'C'

TO REMOVE TRIP LEVER FROM AN ASSEMBLED MACH. PERFORM OPER. # 4-106X [L.H. SIDE] 129.



384  
A

## LINE UP THE CYCLE STOPPING ARM.

THIS IS NOT AN ASSEMBLY OPERATION AS THIS PART IS TAKEN OUT AGAIN AFTER IT IS LINED  
UP AND FUNCTION TESTED

IT IS GOOD PRACTICE TO HEAD OVER EACH OF THE FOLLOWING RIVETS - S - R - P - Q TO BE SURE THEY ARE TIGHT

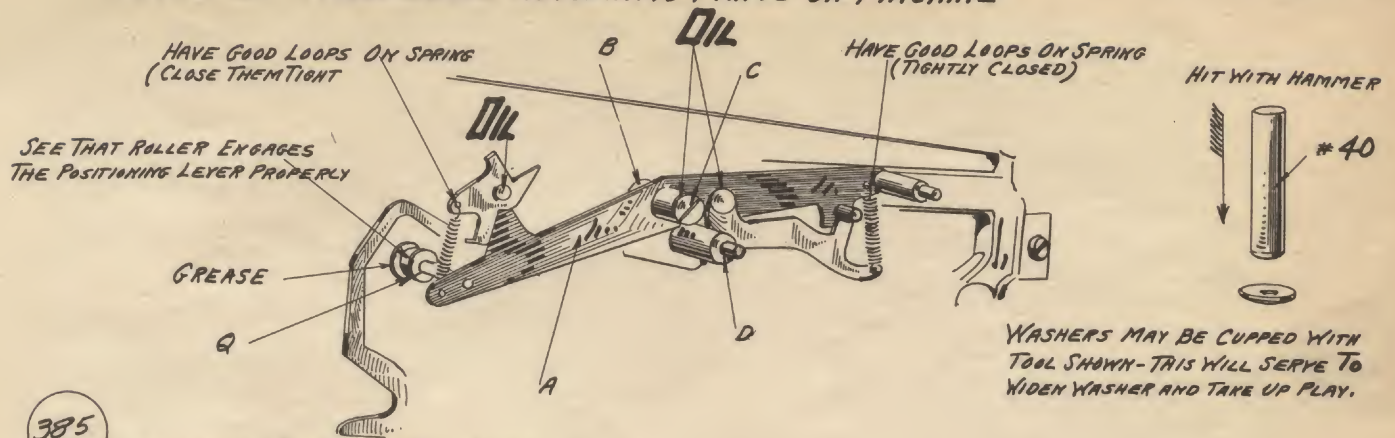
INSERT HUB 'U' IN FRAME AND PLACE PART UNDER PIN 'V' - SEE ALSO THAT RELEASE LATCH ARM 'Z' IS UNDER PIN 'R'  
MOVE PART 'T' UP IN DIRECTION OF ARROW 'W' UNTIL PART STRIKES BUMPER 'AA' - WHEN THUS PLACED PIN 'R' SHOULD  
HAVE ACTED UPON LATCH ARM 'Z' AND THROWN THE LUG 'X' OUT OF NOTCH OF CLUTCH YOKE POSITIONER 'Y' (THE LUG SHOULD  
BE CLEAR ABOUT 1/32 AT 'XX' IF NOT CLEAR ENOUGH. BEND THE ARM 'Z' UP A LITTLE.

AFTER ABOVE ADJUSTMENTS HAVE BEEN MADE REMOVE THIS UNIT SO NEXT UNIT  
CAN BE INSERTED (NOTE THAT SPRING K 781A HAS NOT AS YET BEEN ATTACHED)



# NOTES ON ASSEMBLING AUTOMATIC PARTS ON MACHINE

PLATE 64



385  
A

## ASSEMBLE THE STOPPING LEVER.

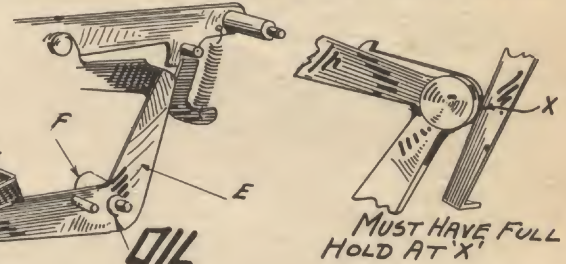
ASSEMBLE WASHER 'B' - OVER HOLE IN FRAME JUST ABOVE STUD 'D' - PLACE PART 'A' AS SHOWN AND INSERT SCREW 'C' TIGHTLY - SEE THAT 'A' FUNCTIONS FREELY WITH VERY LITTLE PLAY. IF TOO MUCH PLAY EXISTS TAKE WASHER 'B' AND CUP IT SLIGHTLY WITH TOOL #40 TO TAKE OUT PART A FROM ASSEMBLED MACH. PERFORM OPER. #4-106X [LH SIDE] 176-189-191-193-130-194-195

386  
A

## ASSEMBLE THE QUICK STROKE LATCH.

TO TAKE PART OUT OF AN ASSEMBLED MACHINE PERFORM OPER. #4-106X [LH SIDE] 191-192.

THIS MUST NOT TOUCH AT THIS POINT  
PROVIDE  $\frac{1}{32}$ " CLEARANCE  
DO NOT BEND BUT GRIND IT SLIGHTLY.

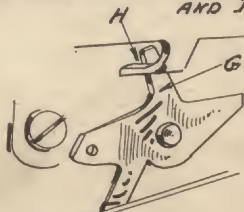


## ADJUSTMENT NOTE.

UNITS SHOWN AT 384A-385A-386A - ARE TO BE ADJUSTED TOGETHER - THEREFORE ASSEMBLE THE CYCLE STOPPING ARM (384A) AGAIN.

TO TAKE THESE PARTS OUT OF AN ASSEMBLED MACHINE PERFORM OPER. #4-106X [LH SIDE] 176-189-130-193-191-194

MAKE SURE LIFTER 'G' IS BEHIND LUG 'H' ON TRIP LEVER AND IN ALIGNMENT SO IT WILL ENGAGE WHEN LIFTING



VIEW WHEN LIFTER IS NEUTRAL

TO POSITION THE LIFTER AS ABOVE - BEND ARM 'A'

BRING STOP LATCH 'L' TO POSITION SHOWN. RAISE LIFTER 'G' UNTIL IT ENGAGES LUG AT 'J' - LIFT VERY SLOWLY - AT THE KNOCK OFF INSTANT 'J' A CLEARANCE AS SHOWN 'K' SHOULD BE BETWEEN TRIP LEVER AND STOP LATCH.

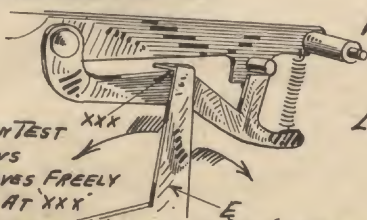
TO INCREASE THIS LIFT PEEN AT 'XX' WITH A HAMMER.

MOVE LATCH 'E' TO POSITION SHOWN BELOW RAISE LIFTER AGAIN -

- AT KNOCK OFF INSTANT 'J'

THERE SHOULD BE A CLEARANCE (NOT LESS THAN .010" CLEARANCE) AS SHOWN AT 'ZZ'

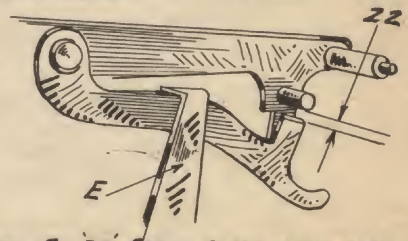
HOLD DOWN PIN 'M' WITH FINGERS - LEVER 'E' WILL THEN BE IN NEUTRAL POSITION



WHEN IN THIS POSITION TEST AS SHOWN BY ARROWS AND SEE THAT IT MOVES FREELY AND DOES NOT TOUCH AT 'XXX'

HOWEVER THE CLOSER 'E' COMES TO 'XXX' WITHOUT FRICTION THE BETTER

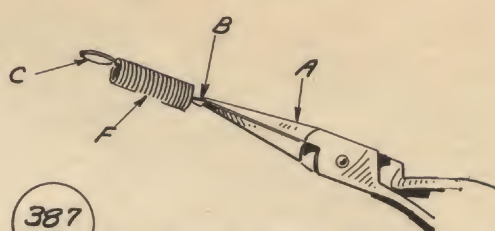
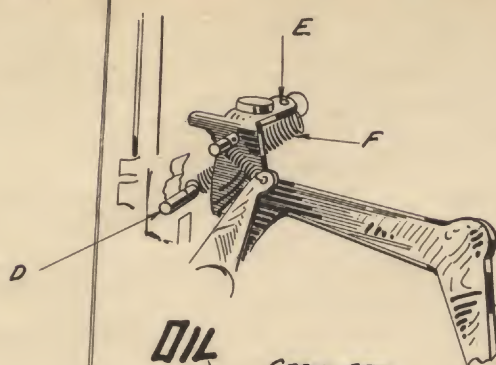
LATCH 'E' MAY BE BENT TO TAKE OUT PLAY



IF NO CLEARANCE APPEARS AT 'ZZ' BEND STOPPING LEVER ROLLER STUD 'Q' (ABOVE) DOWNWARD VERY LITTLE AT A TIME.



NOTES ON ASSEMBLING AUTOMATIC PARTS ON MACHINES.

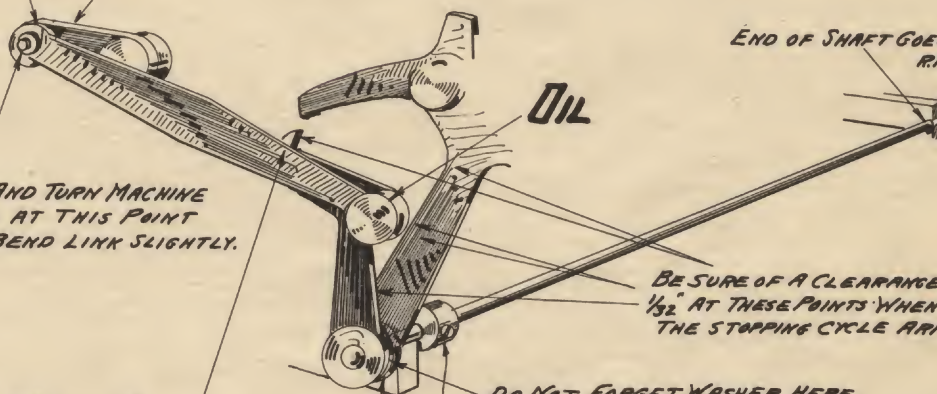


387  
A

ASSEMBLE SPRING FOR CYCLE STOPPING ARM

THIS CAN BE DONE WITHOUT TAKING OUT KEY BOARD - GRASP SPRING 'F' BY LOOP 'B' WITH PLIERS 'A' HOOK LOOP 'C' ON STUD 'D' IN FRAME. HOLD SPRING LOOP 'B' TIGHTLY AND INSERT INTO ARM AT 'E'.

**OIL**  
CRANK ARM  
PUT IN HANDLE AND TURN MACHINE TO TEST FOR BIND AT THIS POINT IF BIND EXISTS BEND LINK SLIGHTLY.



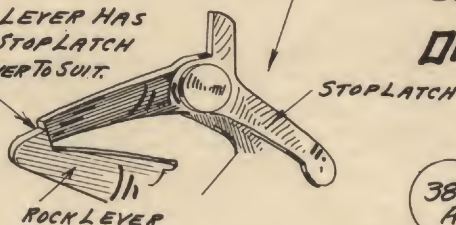
END OF SHAFT GOES IN HOLE IN R.H. FRAME

BE SURE OF A CLEARANCE OF AT LEAST  $\frac{1}{32}$ " AT THESE POINTS WHEN THEY PASS THE STOPPING CYCLE ARM.

DO NOT FORGET WASHER HERE

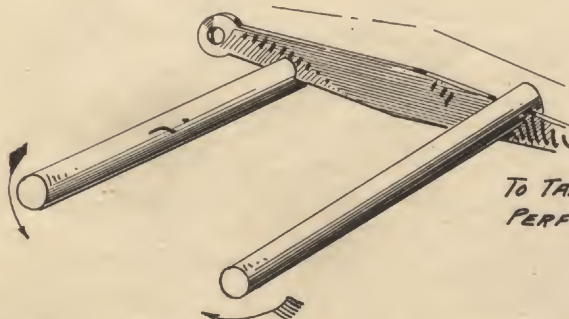
WHEN ASSEMBLED ADJUST COLLAR TO NO LESS THAN .005 CLEARANCE ON INNER SIDE OF L.H. FRAME.

SEE THAT ROCK LEVER HAS FULL HOLD ON STOP LATCH IF NOT BEND LEVER TO SUIT.



388  
A

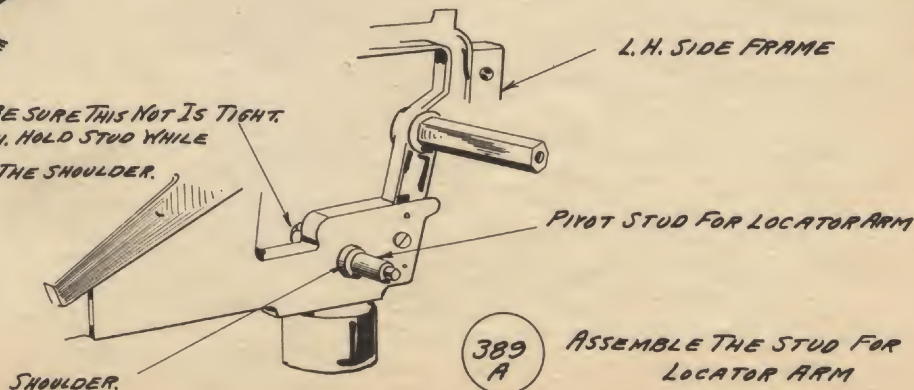
ASSEMBLE THE ROCK LEVER AND CONNECTING LINK (SEE THAT STUDS ARE ALL TIGHT)



TO DO THE ABOVE BENDING OPERATIONS WHILE PARTS ARE IN THE MACHINE USE THE TOOLS 37 SHOWN OR PLIERS

TO TAKE OUT THE ROCK LEVER AND CONN. LINK FROM AN ASSEMBLED MACHINE PERFORM OPER. #4 - 106X (L.H. SIDE) 130-193

BE SURE THIS NOT IS TIGHT. USE  $\frac{3}{8}$ " WRENCH. HOLD STUD WHILE TIGHTENING AT THE SHOULDER.



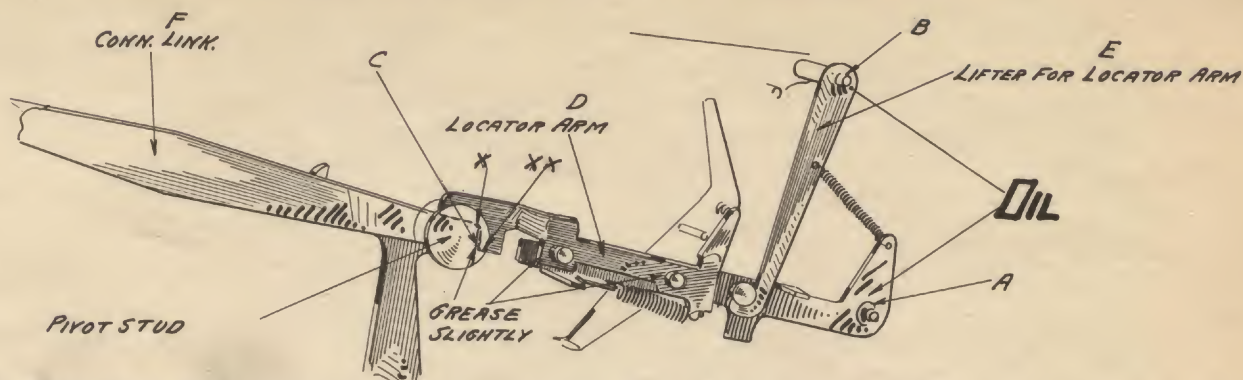
389  
A

ASSEMBLE THE STUD FOR LOCATOR ARM



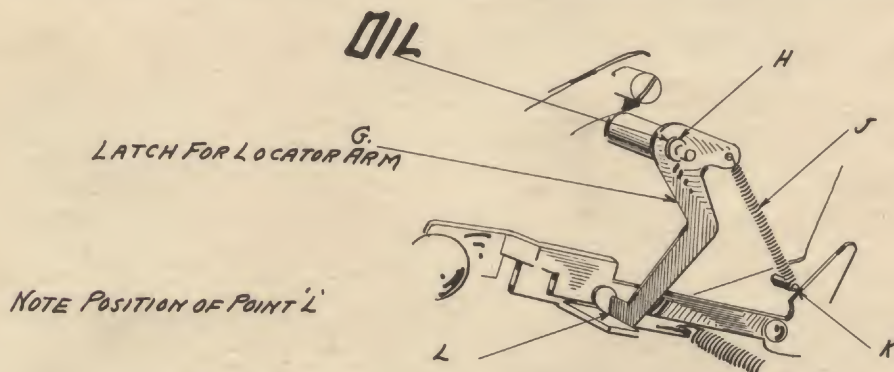
# NOTES ON ASSEMBLING AUTOMATIC PARTS ON MACHINE

PLATE 66



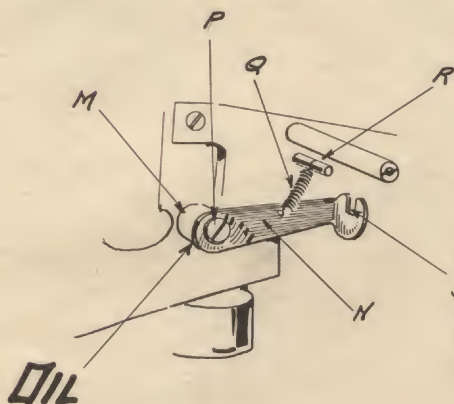
390 A ASSEMBLE THE LOCATOR ARM AND LIFTER-PLACE ARM D' ON STUD A' AND LIFTER E' ON STUD B'. SEE THAT POINT C' OF ARM IS IN ALIGNMENT WITH CONN. LINK F' (IF NOT - IT MUST BE BENT TO SUIT WITH TOOL #37 AS SHOWN IN 389A PLATE 65)

WHEN OPERATING MAKE SURE THAT POINT 'XX' DOES NOT HIT POINT 'X' OF CONN. LINK.



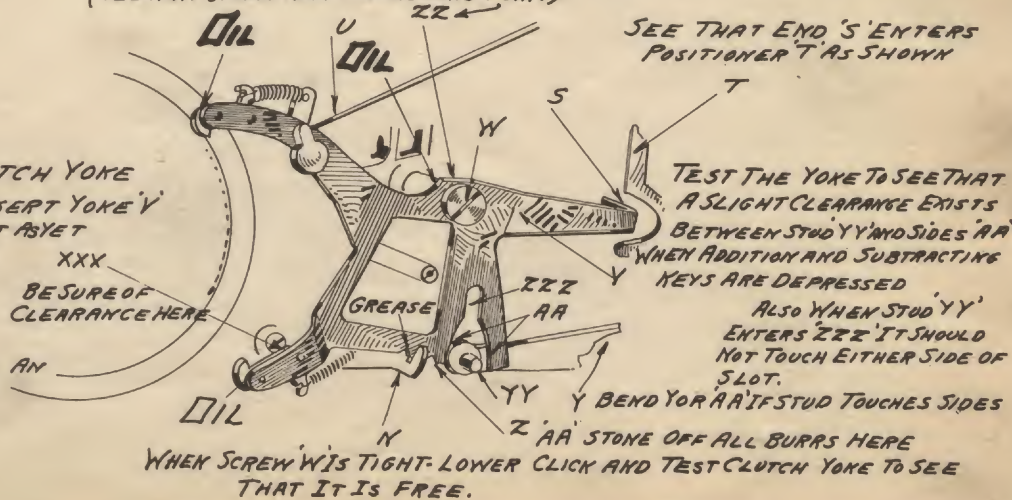
391 A ASSEMBLE THE LATCH FOR LOCATOR ARM

PLACE LATCH 'G' UPON STUD 'H' HOOK UP SPRING 'J' ON PIN 'K'



392 A ASSEMBLE THE CLUTCH YOKE CLICK ASSEMBLE THE COLLAR 'M' TO CLICK 'N' AND HOLD TOGETHER WHEN INSERTING SCREW 'P' TO FRAME. FASTEN SCREW 'P' TIGHTLY TO FRAME. HOOK SPRING 'Q' TO PIN 'R' (MAKE SURE THAT CLICK WORKS FREELY BEFORE HOOKING UP SPRING)

STONE THIS SLOT FREE FROM BURRS - IT MUST BE SMOOTH AND CLEAN. (SEE THAT CRANK ARM CLEARS THIS POINT)

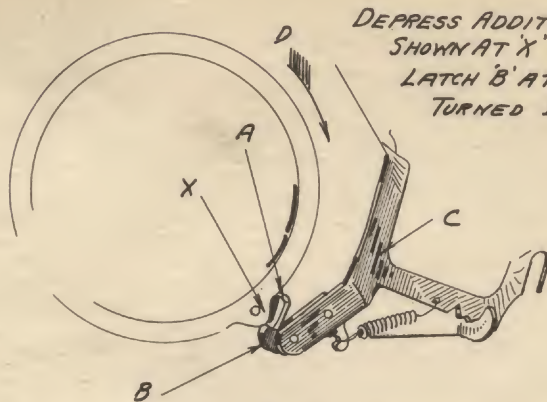


393 A ASSEMBLE THE CLUTCH YOKE HOLD DOWN 'N' AND INSERT YOKE 'V' INSERT SCREW 'W' BUT DO NOT AS YET PUT ON THE NUT IN REAR OF SCREW 'W'

TO TAKE UNIT 392A-393A OFF AN ASSEMBLED MACH. SIMPLY TAKE OFF BELL.



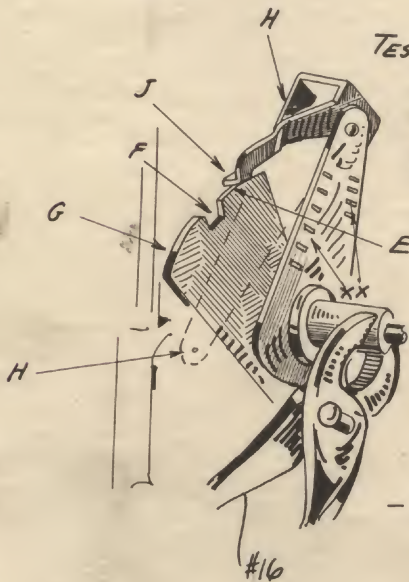
# NOTES ON THE ADJUSTMENT-TEST-AND REPAIR OF AUTOMATIC PARTS. PLATE 67



DEPRESS ADDITION KEY AND BRING PLANET GEAR ARM 'A' TO POSITION SHOWN AT 'X'. IT IS IMPORTANT THAT THE ARM 'A' SHOULD ENGAGE LATCH 'B' AT A POINT ABOUT CENTRAL WHEN PLANET GEAR IS TURNED IN DIRECTION OF ARROW 'D'.

LOOK FOR WEAR AT 'A' AND 'B' AND REPLACE PARTS IF TOO MUCH WORN

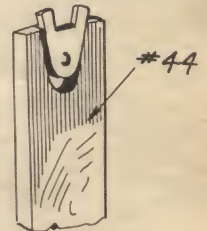
REMOVE DRIVING HANDLE FOR THE TESTS BELOW  
— WITH MACHINE IN NEUTRAL —



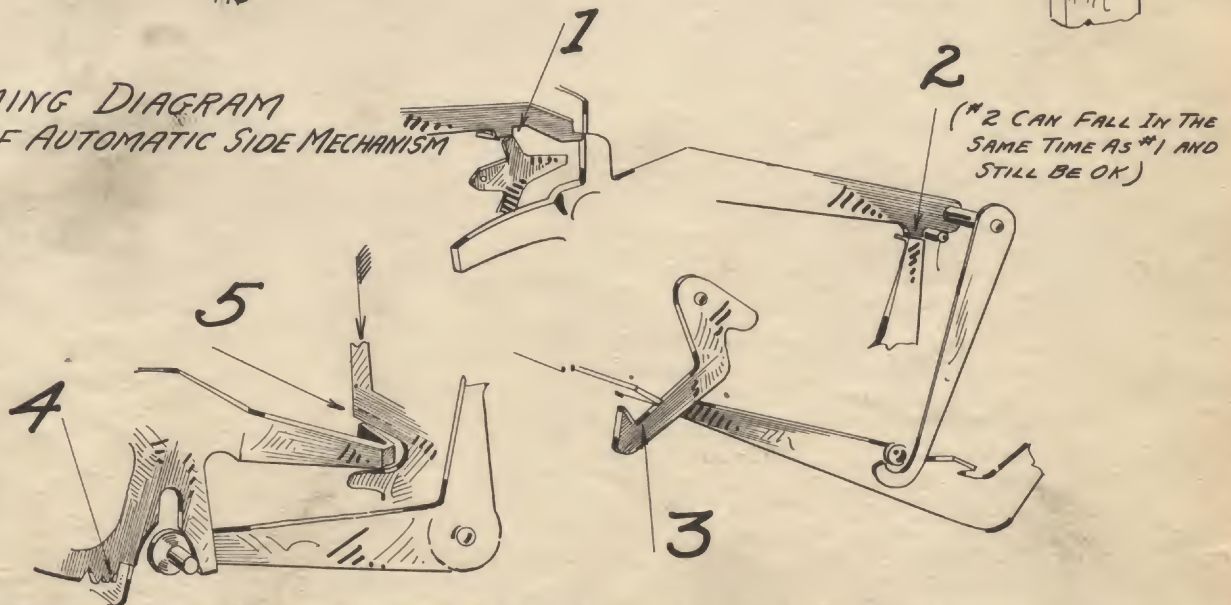
TEST THE FUNCTIONING OF THE LATCH 'J' WITH FINGER HOLD OUT 'H' AND DEPRESS ADDITION KEY. LET GO OF 'H' AND LATCH WILL REST ON POSITIONER AT 'E'. RELEASE ADDITION KEY VERY SLOWLY AND SEE THAT LATCH 'J' ENTERS SLOT 'F' AND NOT HANG UP AT THE CORNER. TEST THE SUBTRACT KEY SAME WAY (LATCH THEN RESTS AT 'G').

TO REPAIR THIS CONDITION TAKE OFF LATCH UNIT AND PEEN AS NEEDED AT 'XX'. ALSO THE SHAFT MAY BE TWISTED SLIGHTLY BY HOLDING FORK WITH SPECIAL WRENCH #44 AND WITH PLIERS #16 TWISTING THE SHAFT THE REQUIRED AMOUNT

— BE SURE MACHINE IS IN NEUTRAL —  
POSITION BEFORE MAKING TEST BELOW.



## TIMING DIAGRAM OF AUTOMATIC SIDE MECHANISM



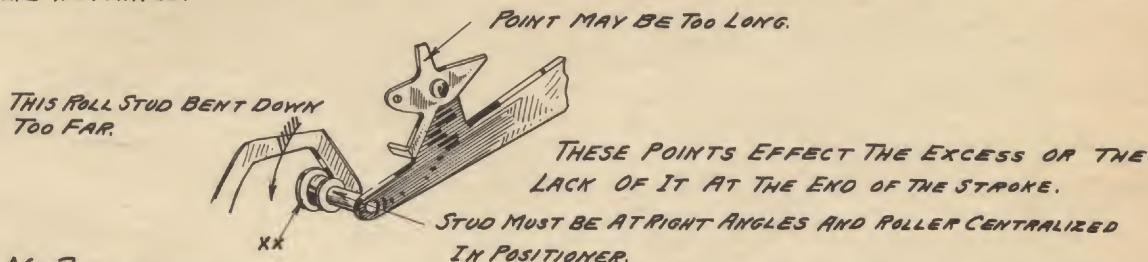
THE DEPRESSION OF EITHER THE  $\ominus$  OR  $\oplus$  KEY SERVES TO EFFECT FIVE FUNCTIONS - EACH OF THESE FUNCTIONS MUST BE IN PROPER ROTATION OR MACHINE WILL NOT OPERATE PROPERLY  
1ST. THE LIFTER MUST FALL UNDER LUG OF TRIP LEVER - 2ND THE OFFSET OF THE QUICK STROKE LATCH MUST SLIP UNDER SHELVE OF STOPPING LEVER - 3RD. LATCH HOOK SLIPS UNDER LEDGE OF LOCATOR ARM - 4TH. CLUTCH YOKE NOTCH ENGAGES CLICK - 5TH. REPRESENTS FURTHER MOVEMENT OF KEY - TO SHOW THAT AN EXCESS OF STROKE EXISTS.



## ADJUSTING PARTS FOR PROPER TIMING

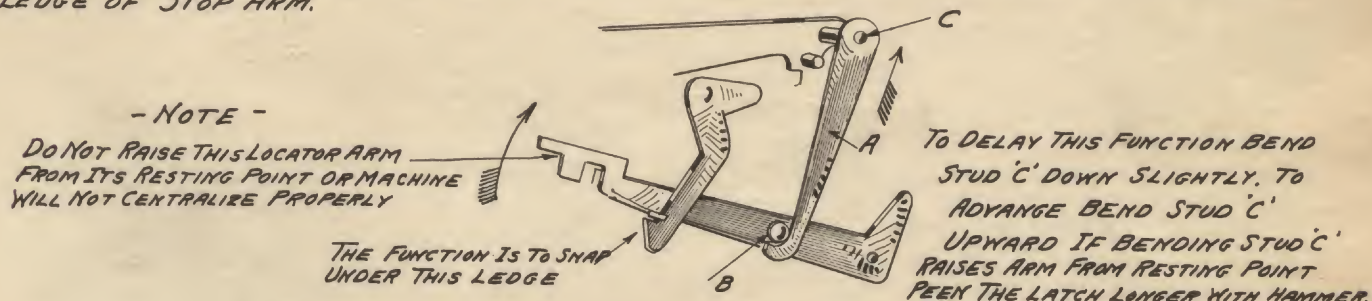
(SEE DIAGRAM ON PLATE 67)

FUNCTION NO 1 - ALTHOUGH IT MUST HAPPEN FIRST - MAY HAPPEN AT A POINT OF THE KEY STROKE THAT IN TRYING TO ADJUST OTHER FUNCTIONS THEY WILL ALL BE TOO LATE AND NOT ENOUGH EXCESS STROKE RETAINED.

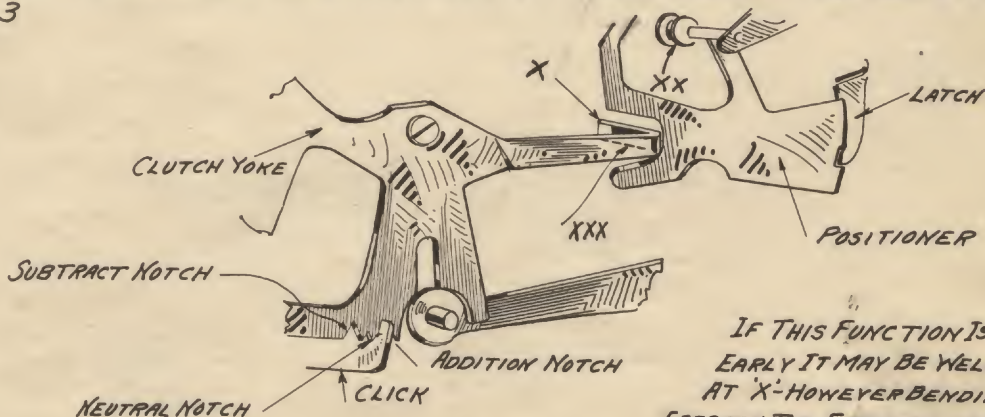


FUNCTION NO 2 THIS SHOULD FOLLOW CLOSE UPON FUNCTION #1 OR AT THE SAME TIME SEE PLATE 64 OPER. 386. AND TRY FOR THIS ADJUSTMENT. AND IT WILL FOLLOW THAT TIMING WILL BE OK.

FUNCTION NO 3 THIS FOLLOWS AFTER 1 AND 2 AND IS EFFECTED BY LEVER 'A' LIFTING GUIDE STUD 'B' AS THE KEY KEEPS ON BEING DEPRESSED - UNTIL LATCH SLIPS UNDER LEDGE OF STOP ARM.



FUNCTION NO 4 IS WHEN THE KEY DEPRESSION HAS RESULTED IN PUSHING THE CLUTCH YOKE INTO THE PROPER POSITION OF NOTCH. AND IS THUS HELD BY THE CLICK. AND FOLLOWS FUNCTION NO 3

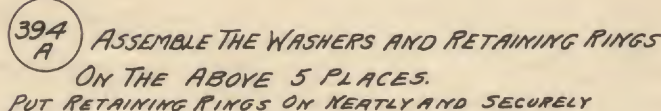


IF THIS FUNCTION IS TOO LATE OR EARLY IT MAY BE WELL TO BEND LUG AT 'X' - HOWEVER BENDING HERE EFFECTS THE FUNCTION OF BOTH KEYS - (GRINDING MAY BE NEEDED AT 'XXX' TO AID THE MINUS FUNCTION)

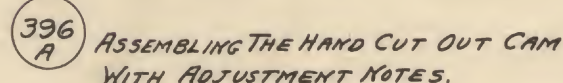
THEREFORE COMPARE THE POSITION OF BOTH KEYS AND BEND EITHER LUG AT 'X' OR ROLLER STUD 'XX' TO SUIT THE CONDITION.

FUNCTION NO 5 IS SIMPLY A FURTHER PRESSURE DOWNWARD OF THE KEYS TO ASCERTAIN THAT A FULL STROKE HAS NOT BEEN ENTIRELY USED UP TO CAUSE FUNCTION #4 AND AN EXCESS EXISTS. (SEE NOTE ON FUNCTION #1 TO ACQUIRE MORE EXCESS STROKE)



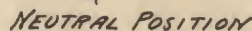


395  
A ASSEMBLE THE NUT LEFT OFF AT OPER. #393A AND TIGHTEN SECURELY BY TAPPING IT AT CORNERS WITH A SMALL SCREW DRIVER.



REMOVE OLD STYLE HANDLE. INSERT THE REGULAR HANDLE (WHICH HAS A LONGER POINT) THIS INSERTION OF THE HANDLE SHOULD HAVE RAISED THE LOCATOR ARM FROM POSITION IN FIG<sup>#1</sup> TO THAT OF FIG<sup>#2</sup> WHEN IN THIS POSITION HOLD ROD AT POINT 'P' WITH THUMB AND BRING COLLAR 'H' WITH SPRING 'J' TIGHT AGAINST THE FRAME AND TIGHTEN SET SCREW 'K' WHEN HANDLE IS REMOVED AND LOCATOR ARM IS AGAIN IN NEUTRAL THERE MUST BE A LITTLE CLEARANCE BETWEEN LUG 'E' AND CAM SURFACE AT 'Q'.

BE SURE THAT WHEN THE CRANK HOLE COVER IS  
INSERTED THAT IT DOES NOT DISTURB CLEARANCE  
AT 'Q' (FILE END OF COVER PIN IF IT SHOWING  
DOES)



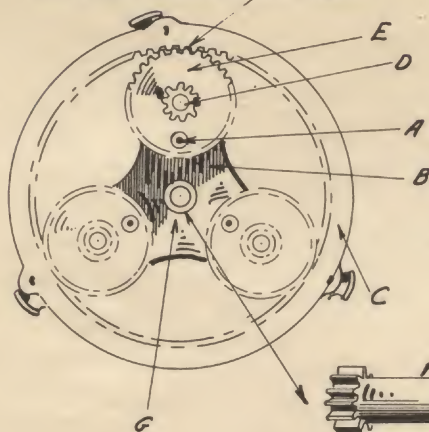
A detailed line drawing of a mechanical linkage. It features a horizontal lever pivoted on the left. A spring is attached to the lever and a fixed point. A vertical link is connected to the lever and another part of the mechanism. The letter 'P' is labeled with an arrow pointing to a specific joint or point on the vertical link.

SHOWING LOCATOR ARM DISENGAGED  
SO MACHINE MAY BE OPERATED BY HAND CRANK  
FIG 2



## NOTES ON ASSEMBLING THE DRIVING UNITS AND TRANSMISSION.

GREASE THIS UNIT WELL



397  
A

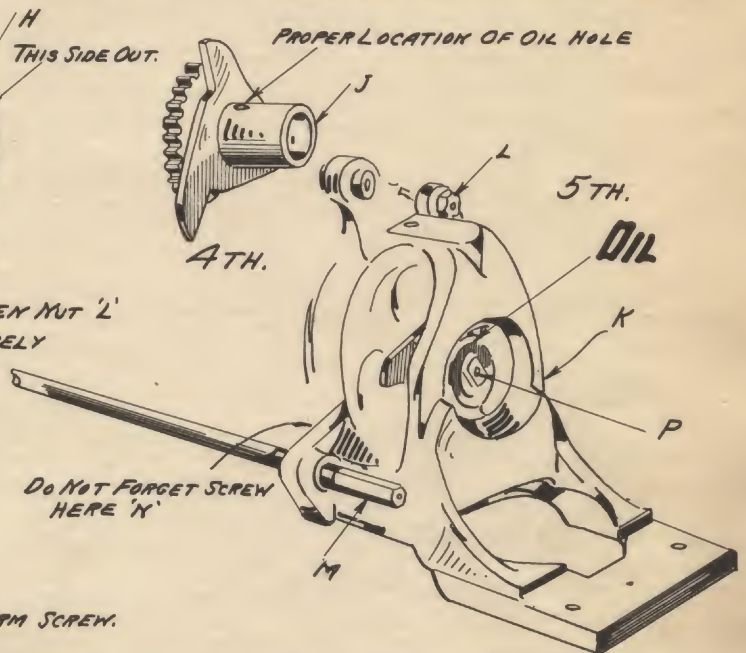
### ASSEMBLE THE PLANET PINIONS.

PINIONS 'E' WILL BE FOUND TO CONTAIN A PEEP HOLE AND SPIDER 'B' CONTAINS 3 DOTS 'A' PLACE GEARS 'E' INTO INTERNAL GEAR SO THAT THESE DOTS ARE SEEN THROUGH THE PEEP HOLE AND OVER STUD 'D'

INSERT THE SUN PINION 'F' AT 'G' - ASSEMBLE WASHER 'H' UPON THE HUB OF 'F' - ASSEMBLE SUBTRACTION SUN GEAR 'J'

2ND.

3RD

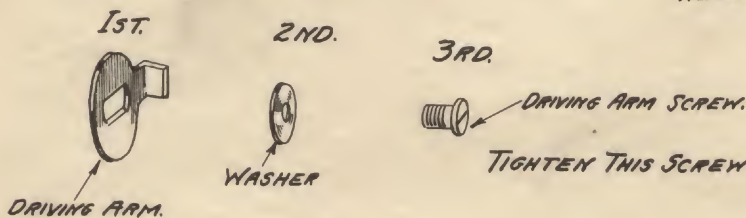


398  
A

ASSEMBLE THE MOTOR BRACKET 'K' TIGHTEN NUT 'L' COVER CASE POST 'M' AND SCREW 'N' SECURELY

399  
A

ASSEMBLE DRIVING ARM AND PARTS. AT 'P'

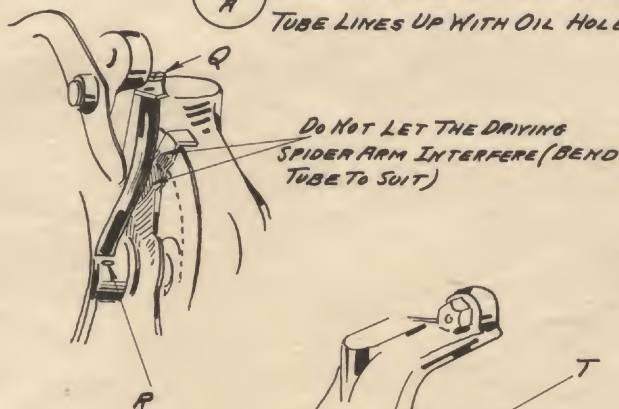


DO NOT FORGET SCREW HERE 'N'

TIGHTEN THIS SCREW SECURELY WHILE WEDGING ARM TO HOLD IT.

400  
A

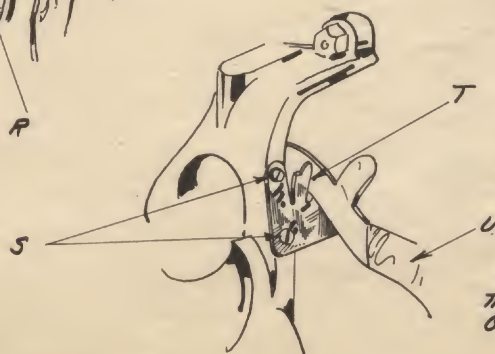
ASSEMBLE THE OIL TUBE AND BRACKET (TIGHTEN SCREW 'Q' AND SEE THAT END OF TUBE LINES UP WITH OIL HOLE IN BEARING CAP 'R')



DO NOT LET THE DRIVING SPIDER ARM INTERFERE (BEND TUBE TO SUIT)

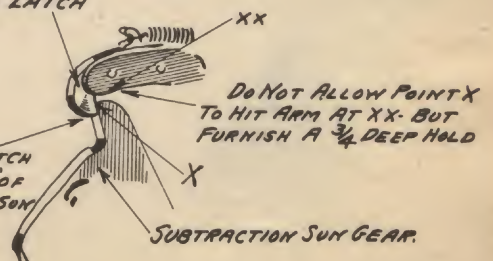
401  
A

ASSEMBLE GUIDE FOR CLUTCH YOKE  
TEST THE MOVEMENT OF THE CLUTCH YOKE 'U' IN THE GUIDE AT 'T' SEE THAT IT DOES NOT BIND AFTER SCREWS 'S' HAVE BEEN TIGHTENED



CLUTCH YOKE LATCH

LINE UP THE LATCH WITH THE POINT 'X' OF THE SUBTRACTION SUN GEAR.

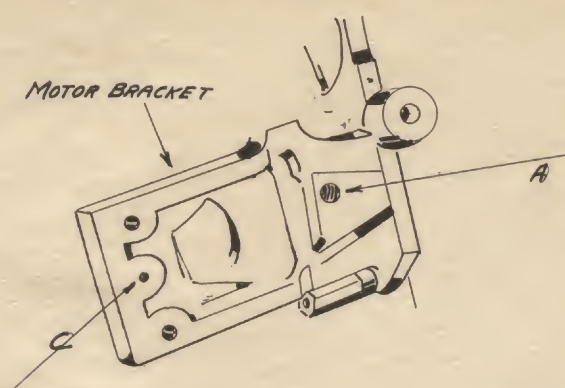


DO NOT ALLOW POINT 'X' TO HIT ARM AT 'XX' BUT FURNISH A  $\frac{3}{4}$  DEEP HOLD

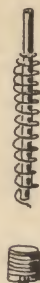
SUBTRACTION SUN GEAR.



## NOTES ON ASSEMBLING OIL WICK MOTOR AND CASE.



MOTOR BRACKET



B

402  
A

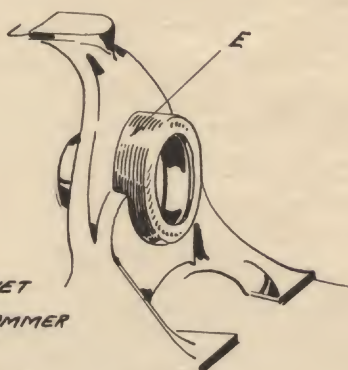
GREASE HOLE 'A' WELL AND INSERT WICK 'B' TO BE FOLLOWED BY A PLUG 'E' INTO HOLE 'A' TIGHTEN PLUG SECURELY.

APPLY THE RUBBER FOOT 'D' TO HOLE 'C'

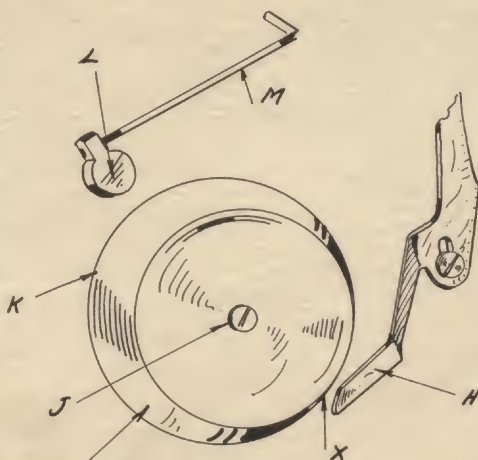
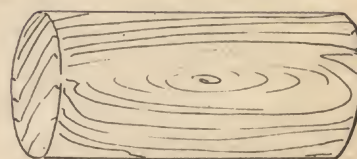


403  
A

ASSEMBLE THE OIL SHIELD 'E'  
INSERT THE SHIELD INTO MOTOR BRACKET  
AND POUND IN WITH WOOD BLOCK AND HAMMER



WOOD BLOCK



404  
A

ASSEMBLE BELL 'K' SCREW IN SCREW 'J'  
TIGHTLY BUT CAREFULLY SO AS NOT STRIP  
THREAD.

ADJUST 'H' BY BENDING SO THAT WHEN LEVER  
SHOWS 'ON' ON KEYBOARD IT WILL LOOK AS SHOWN  
WHEN LEVER HAS BEEN PUSHED TO 'OFF' THIS END 'H'  
WILL REST ON BELL AT 'X'.

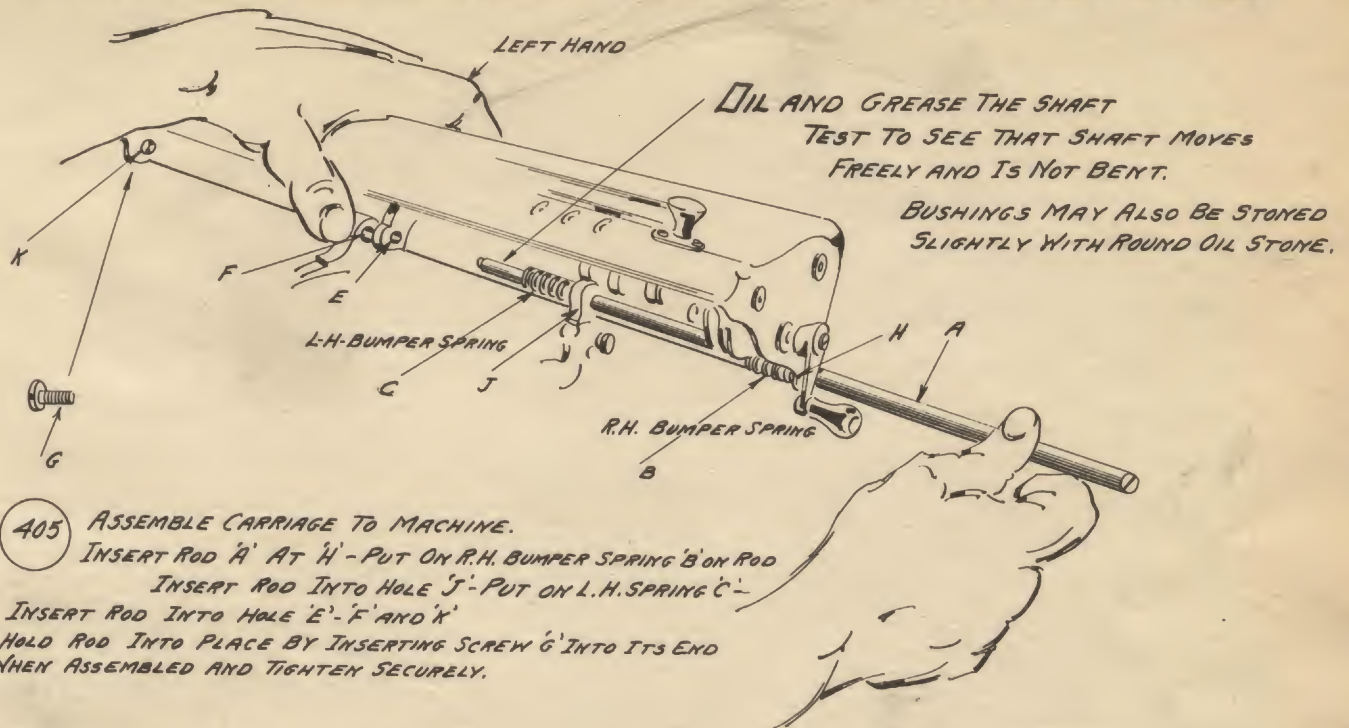
BEND WIRE 'M' OF HAMMER 'L' AND TRY SOUND BY  
TOUCHING TRIP LEVER.

WHEN CARRIAGE IS ON TEST THIS BELL AGAIN AND  
BEND TO SUIT.

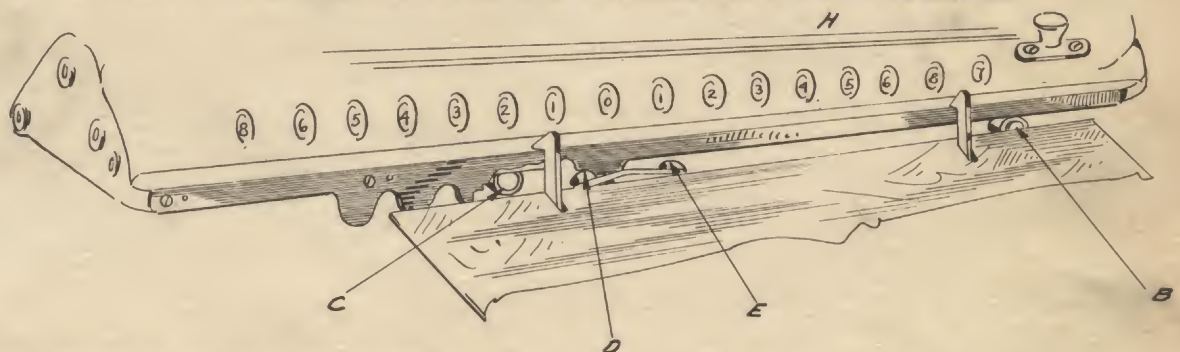
TO INSURE GOOD SOUND OF BELL  
KEEP IT FREE OF DIRT - GREASE AND OIL



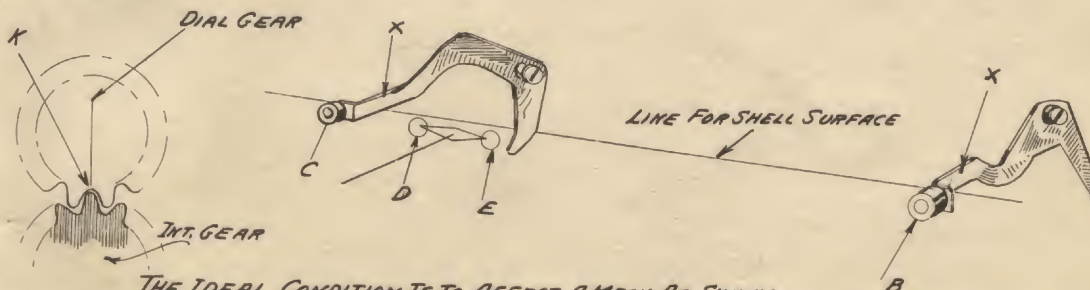
## NOTES ON ASSEMBLING AND ADJUSTING CARRIAGE ON 'KO' AND 'KAO' SERIES MACHINES.



## NOTES ON ADJUSTING THE CARRIAGE TO THE MACHINE. FOR 'KO' AND 'KAO' SERIES.



THE PROPOSITION IS TO ADJUST THE CARRIAGE SO THAT IT WILL NOT ONLY SHIFT FREELY BUT REST AGAIN IN ITS PROPER RELATION TO THE MACHINE BASE. ALSO THE LAY OF THE CARRIAGE DOWNWARD DETERMINES THE DEPTH OF MESH OF REGISTERING DIAL GEARS WITH INT. GEARS. THE LAY OF THE CARRIAGE IS ADJUSTED BY BENDING THE CARRIAGE SUPPORT ARMS 'B'-C'

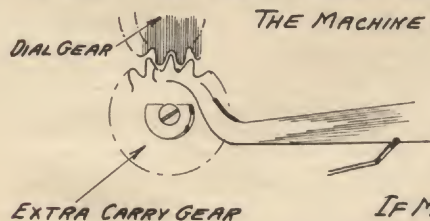


THE IDEAL CONDITION IS TO AFFECT A MESH AS SHOWN.  
 WITH CLEARANCE AT 'K' - AS SHOWN. TO DO THIS THE CARRIAGE IS HELD IN THE PROPER POSITION BY THE SUPPORT ARMS 'B'-C' AND THESE ARMS MUST BE BENT EITHER UP OR DOWN TO SUIT WITH PLIERS AT 'X' THEY MUST ALSO BE EQUALIZED THAT IS ONE MUST NOT HAVE PLAY. ALSO IF BENT DOWN TOO FAR CARRIAGE WILL REST ON SHIFTER YOKE POINT 'E' ALSO IF DOWN TOO FAR THE CLEARANCE 'K' WILL NOT EXIST. BEWARE ALSO OF A HIGH MESH. THIS WILL NOT SEAT THE WEDGES PROPERLY AND CAUSE AN UNDERCARRY. A TOO TIGHT MESH WILL INTERFERE AND CAUSE A WEDGE KNOCK DOWN AND AN OVERCARRY.



## NOTES ON ADJUSTING THE CARRIAGE TO THE MACHINE (CONTINUED)

TO TEST THE ADJUSTMENT OF THE MESH. (REGISTERING DIAL GEARS WITH INT. GEARS). NOTE THAT BY TILTING THE MACHINE A VIEW OF THE MESH AT ITS LEFT END MAY BE OBTAINED. ALSO IT IS GOOD PRACTICE TO REGISTER A ROW OF 8'S INTO THE LOWER DIAL SHAFT AND TEST THE MESH WITH A SCRIBER ON THE FACE OF THE DIAL. TO NOTE THE PLAY- IN DOING THIS HOLD THE INT. GEAR WITH THE FINGERS TIGHTLY WHILE TESTING THE MESHED DIAL.

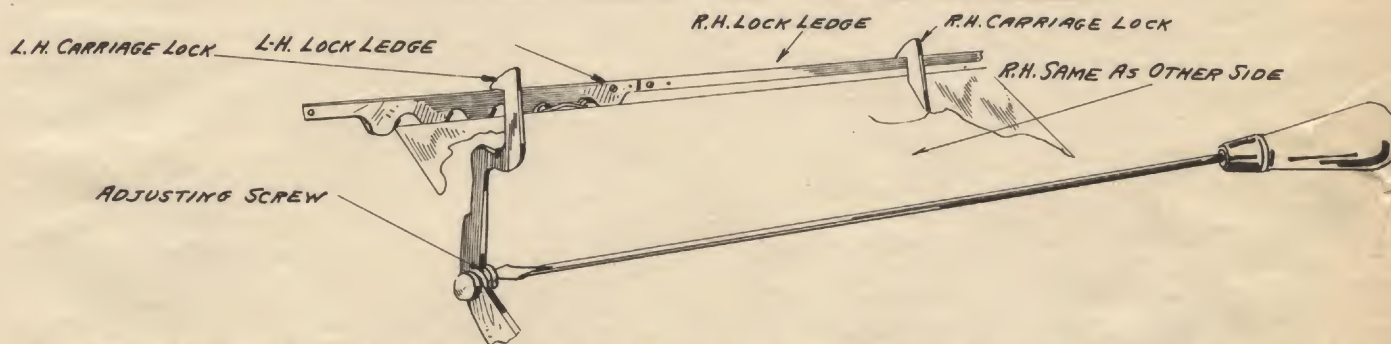


EXTRA CARRY GEAR

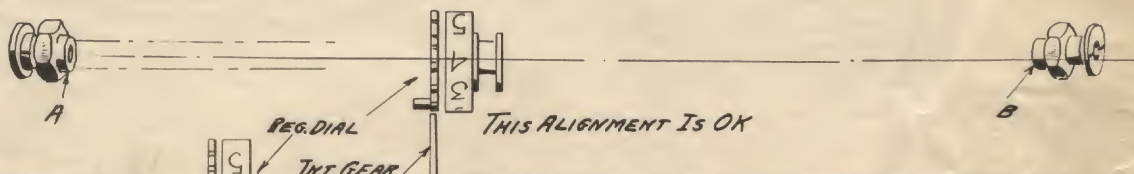
IF MESH IS HIGH' LOWER THE SUPPORT ARMS 'B-C' PLATE 72 TO BRING IT DOWN.

BUT MAINTAIN A CLEARANCE BETWEEN THE CARRIAGE AND SHIFTER YOKE ALWAYS. (THIS SHIFTER YOKE IS ADJUSTABLE (SEE OPER #361 PLATE 58))

IF MESH IS TOO LOW' OR 'TOO TIGHT' BEND ARMS 'B-C' UPWARD.



AFTER THE MESH OR 'LAY' OF THE CARRIAGE HAS BEEN ADJUSTED THE LOCKS MAY BE RAISED OR LOWERED TO HOLD DOWN CARRIAGE PROPERLY. ADJUST NOT TOO TIGHTLY OR IT WILL CAUSE A KNOCK — TOO LOOSE AN ADJUSTMENT WILL CAUSE CARRIAGE TO ROCK AND CAUSE TROUBLE. IT SOMETIMES HAPPENS THAT CARRIAGE LOCK LEDGE IS SLIGHTLY UNEVEN SMOOTH THE UNEVENNESS WITH A SCRAPER OR FILE.

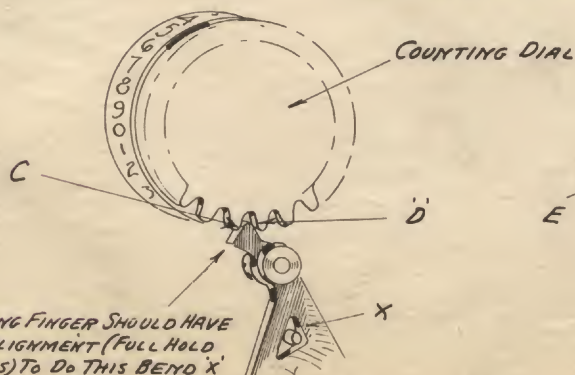


THE VIEW TO THE RIGHT SHOWS THAT ALIGNMENT IS OFF AND L.H. BUSHING 'A' MUST BE FILED AND A WASHER OR NEW BUSHING INSERTED AT THE R.H. END 'B'

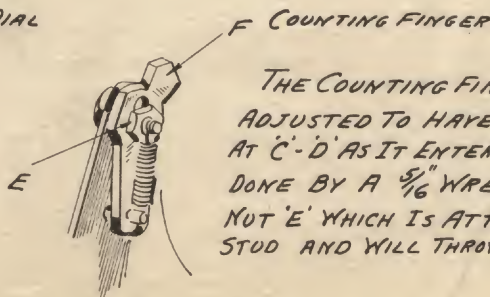
INT. GEAR

THE REG. DIAL GEARS SHOULD BE IN ALIGNMENT WITH THE INT GEARS. TO NOTE THIS ALIGNMENT SLIP OFF TWO CHECK ROLLERS FROM INT. GEARS IN WEDGE SHAFT. AND FROM THE REAR OF THE MACHINE THE ALIGNMENT MAY THEN BE SEEN. NOTE IN WHICH DIRECTION THE ALIGNMENT IS OFF AND FILE END OF BUSHING 'A' OR 'B' AS REQUIRED TO ALIGN — AND INSERT NEW BUSHING OR WASHER TO TAKE UP TOO MUCH PLAY.

## ADJUSTING THE COUNTING FINGER



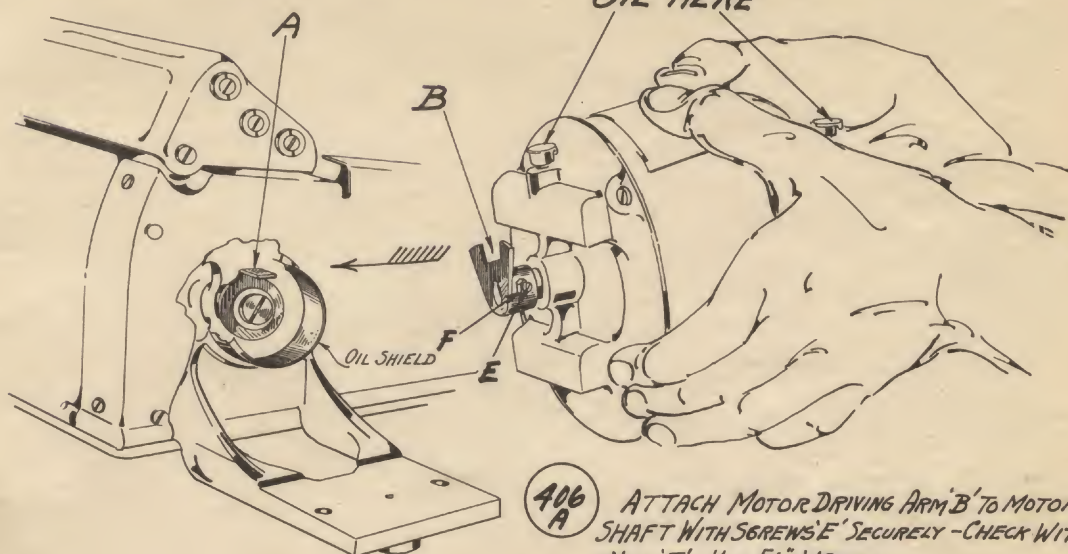
COUNTING FINGER SHOULD HAVE GOOD ALIGNMENT (FULL HOLD, SIDEWAYS) TO DO THIS BEND 'X' WITH PLIERS TO SUIT.



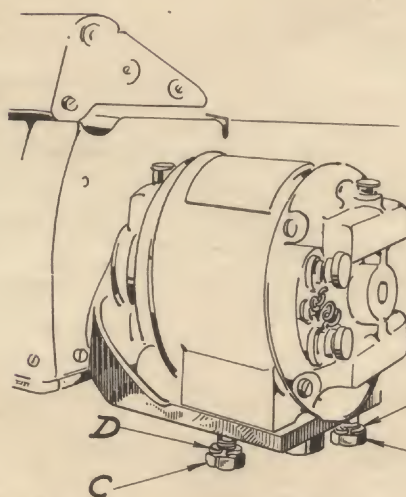
THE COUNTING FINGER SHOULD BE ADJUSTED TO HAVE THE SAME CLEARANCE AT 'C'-D' AS IT ENTERS AND LEAVES THIS IS DONE BY A 5/16" WRENCH OPERATING ON NUT 'E' WHICH IS ATTACHED TO AN ECCENTRIC STUD AND WILL THROW POINT 'F' TO SUIT.



## HOW TO ATTACH THE MOTOR TO AUTOMATIC MACHINES.



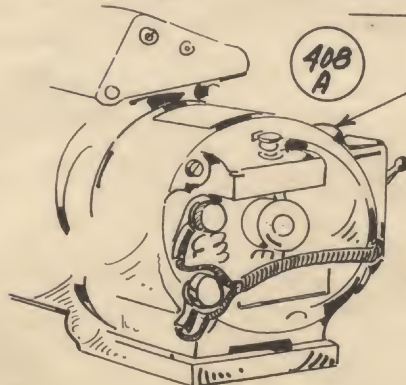
**406 A** ATTACH MOTOR DRIVING ARM 'B' TO MOTOR SHAFT WITH SCREWS 'E' SECURELY - CHECK WITH NUT 'F' USE  $\frac{5}{16}$ " WRENCH.



**407 A** SIMPLY TURN 'A' WITH THE FINGER UNTIL THE LUG IS AT THE TOP AS SHOWN.

TURN MOTOR COUPLER UNTIL SLOT 'B' IS AT TOP AS SHOWN. GRASP MOTOR IN HANDS AS SHOWN, -TILT IT TO ALLOW COUPLER 'B' TO PASS OIL SHIELD AND ENGAGE LUG 'A'.

ATTACH MOTOR TO FRAME WITH THE BOLTS AND LOCK WASHERS 'C-D' (USE A  $\frac{1}{2}$ " WRENCH AND FASTEN SECURELY)



**408 A** ATTACH THE MOTOR SWITCH SECURELY

**409 A**

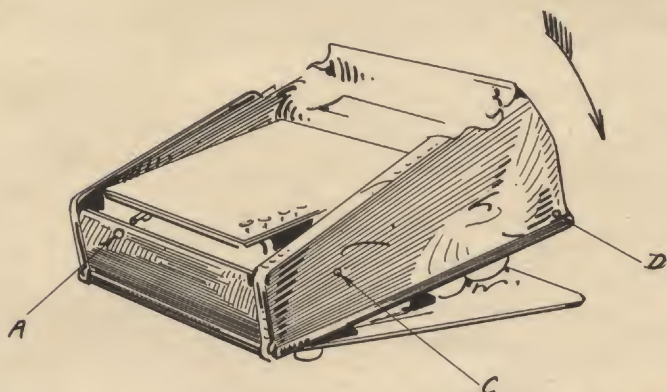
ATTACH WIRES AS SHOWN

PLACE BRASS WASHERS BETWEEN TERMINAL AND KNOB ON TOP OF THE TERMINAL TO MAKE A GOOD CONNECTION.



## NOTES ON ASSEMBLING THE COVER CASE AND BOTTOM PLATE.

- 410 REMOVE CARRIAGE SHIFT LEVER HANDLE AND ITS SPACING COLLAR. SEE OPER. #1-2-3-4 PLATE I AND #103 PLATE 14 COVER CASE CANNOT BE ASSEMBLED WITH THESE PARTS ON.



- 411 PLACE COVER CASE OVER MACHINE.

INSERT THE SCREWS AT 'C-D' (TWO ON OPPOSITE SIDE ALSO) TIGHTEN THEM EQUALLY NOT ONE AT A TIME.

REPLACE THE SPACING COLLAR UPON THE SHIFTING ROD AT 'A'

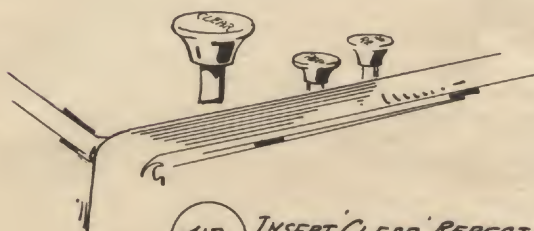
REPLACE SHIFTING HANDLE (SEE OPER. #375) SPIN IT TO SEE THAT IT REVOLVES FREELY IF TIGHT HOLE 'A' MUST BE FILED.

### NOTE ON SECTIONAL CASE

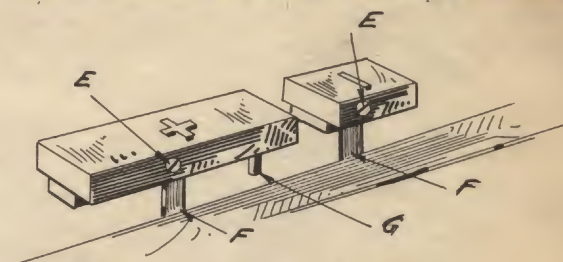
- 412 TURN MACHINE UP SIDE DOWN AND REMOVE THE RUBBER FEET.

PLACE LINOLEUM WITH SMOOTH SIDE OUT OVER BOSSES-PLACE BOTTOM PLATE ON MACH.-LINE UP THE HOLES AND ATTACH THE RUBBER FEET SECURELY (THERE ARE ALSO 4 MORE BOTTOM SCREWS TO BE INSERTED)

ON THE AUTOMATIC MACH. A PAD TO CATCH OIL DRIPPINGS FROM MOTOR IS INSERTED (SEE OPER. #109 PLATE 16)



- 413 INSERT 'CLEAR' 'REPEAT' AND 'NON REPEAT' BUTTONS.



- 414 INSERT - AND + BARS.  
A TIGHTEN SCREWS 'E'  
TEST TO SEE THAT BARS DO NOT RUB CASE AT 'F' TEST STUD 'G' TO SEE THAT IT IS FREE.

- 415 ASSEMBLE THE CARRIAGE TO MACHINE - SEE OPER. #405 PLATE 72

### - NOTE -

AFTER CASE AND BOTTOM PLATE ARE ON SECURELY-TEST THE CARRIAGE LOCKS FOR KNOCKS ON CARRIAGE LOCK LEDGE WHEN MACHINE IS BEING OPERATED. IF KNOCKS APPEAR IT IS BECAUSE THE LEDGE AGAIN NEEDS TO BE SMOOTHED SLIGHTLY.



RUNNING TEST CHART

WHAT	FOR	HOW	GOOD	BAD	REMEDY
COUNTING FINGER	ALIGNMENT AND MESHING	OPERATE CRANK ADD-SUBTRACT AND SHIFT CARRIAGE RIGHT TO LEFT.	DIALS Do NOT WINK OR MISS	DIALS WINK OR MISS	SEE NOTES ON PLATE 73
COUNTING DIALS	CLEARING OUT FUNCTION	REGISTER ALL BLACK 1's	THEY SHOULD ALL CLEAR OUT BY ONE TURN OF CLEAR OUT CRANK	FIGURES LEFT IN HERE AND THERE IN DIALS.	SEE NOTES ON PLATE 9
REGISTERING DIALS	CLEARING OUT FUNCTION	REGISTER ALL 9's	ALL CLEAR OUT WITH ONE TURN	FIGURES LEFT IN	SEE NOTES ON PLATE 9 " " " " 8 (#35)
BELL	SOUND	DEPRESS 1 in FIRST COLUMN AND SUBTRACT - THEN ADD - THEN SHIFT. UNTIL EXTREME RIGHT.	BELL SOUNDS AT EACH TURN	NO RING AT TURN OR DULL SOUND	SEE NOTES ON PLATE 71 (204)
KEYBOARD	ALIGNMENT	PUT IN 999 - HOLD DOWN - ADD THREE TIMES - SUBTRACT THREE TIMES - CLEAR! Do THIS DOWNWARD WITH ENTIRE KEYS	000 IN REG. DIAL SHAFT	FIGURES IN REG. DIAL SHAFT.	DETERMINE WHICH KEY IS AT FAULT. SEE NOTES ON PLATE 53-54-55 56-57
KEYS	RESTORING	DEPRESS NON REPEAT KEY. PUT IN ALL 9's - ADD ONCE - (REPEAT FOR ENTIRE KEY BOARD)	ALL RESTORE	SOME STAY DOWN.	SEE NOTES ON PLATE 58-59 60-61
INDIVIDUAL CLEAR OUT KEY	FUNCTION X	DEPRESS A FIG. IN EACH COLUMN - PRESS EACH COLUMN CLEAR KEY.	ALL RESTORE	SOME STAY DOWN	SEE NOTES ON PLATE 58-59 60-61
CLEAR OUT KEY	FUNCTION	DEPRESS ONE ROW OF FIGURES AT A TIME. DEPRESS CLEAR KEY	ALL RESTORE	SOME STAY DOWN	SEE NOTES ON PLATE 58-59 60-61
KEYS	FREEDOM	HOLD CLEAR KEY DOWN - DEPRESS EACH KEY	QUICK RETURN	STAY DOWN OR SLOW RETURN	SEE NOTES ON PLATE 58-59 60-61
WEDGES	PROPER SEATING	DEPRESS ALL 9's - ADD - TURN HANDLE UNTIL ALL 8's SHOW. RELEASE AND RAISE CARRIAGE SO THAT WEDGES MAY BE SEEN.	ALL WEDGES ARE SEATED PROPERLY	SOME UP OR ONLY 1/2 WAY DOWN CAUSING AN UNDERCARRY	SEE NOTES ON PLATE 37-38-39-40
WEDGES	RESTORING X	ADD ALL 9's TWICE. BRING UP HANDLE SLOWLY ON 2ND TURN - RAISE CARRIAGE -	ALL WEDGES ARE RESTORED	SOME STAY DOWN OR PART WAY DOWN	SEE NOTE ON PLATE 37-38-39-40
CARRYING DOGS	FUNCTION X	ADD IN 9's ADD IN THE 1's TURN SLOWLY	SEE THAT EIGHT 1's AND AN 0 COME UP	WHEN AN 0 SHOWS UP WHERE A 1 OUGHT TO BE	SEE NOTES ON PLATE 41-42-43-44
SELECTING GEARS	FREEDOM. X	HOLD CLEAR KEY DOWN FOR EACH 9 DOWN SEVERAL TIMES.	GEAR RETURNS FREELY AND WITHOUT BIND	BIND OR STICKY GEAR.	SEE NOTES ON PLATE 45-46-47
CARRYING WEDGE SPRING	TENSION X	DEPRESS WEDGE DOWN AND WITH FINGER.	DEFINITE TENSION	WEAK TENSION	SEE NOTE ON PLATE 39
CHECK SPRING	TENSION X	REVOLVE INT. GEAR WITH FINGER.	DEFINITE TENSION	WEAK TENSION	SEE NOTE ON PLATE
COUNTING DIAL SPRING	TENSION X	WHIP THE CRANK AROUND SHARPLY ONCE.	NO 1 SHOWS EVENLY	OVERTHROW (2) FIGURE UNEVEN IN WINDOWS	SEE NOTES ON PLATE 5-6



# Running Tests Continued

PLATE 77

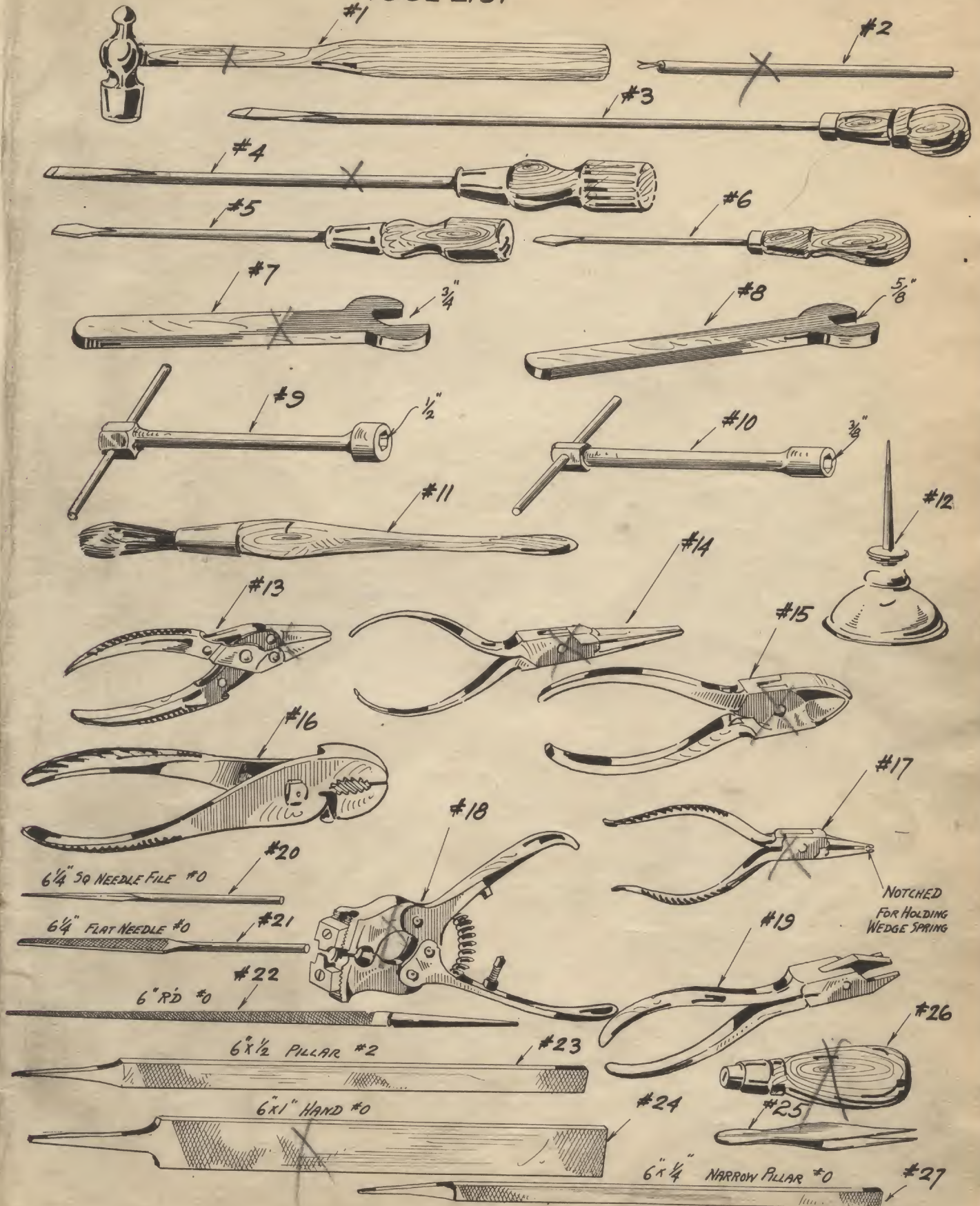
TEST	How	GOOD	BAD	TROUBLE
GENERAL	SET UP 1-2-3-4-5-6-7-9. - MULTIPLY BY 45. - WITH CARRIAGE AT EXTREME LEFT. REPEAT WITH CARRIAGE IN EACH POSITION - TURN CRANK AT REASONABLE FAST SPEED.	ANS. WILL BE - 5-5-5-5-5-5-5-5 AT ALL POSITIONS OF CARRIAGE	ANS. MIGHT BE 5-5-5-5-5-5-5-5 5-5-5-5-5-5-5-5	<p>A'</p> <p>WEAK WEDGE SPRING. TOO MUCH SPRING IN REG. DIAL SHAFT. 'SHY' KEY BOARD ALIGNMENT HIGH MESH WITH CARRIAGE. PLAY IN CARRIAGE LOCKS.</p> <p>B'</p> <p>WEAK CHECK SPRING. WEDGE KNOCK DOWN. FULL KEY BOARD ALIGNMENT. WEAK CARRYING DOG SPRINGS &amp; POOR DOGS. VERY TIGHT MESH WITH CARRIAGE.</p>
GENERAL	SET UP 1-2-3-4-5-6-7-9. OPERATE THE CRANK AT FAST SPEED TEN TURNS - WITH CARRIAGE AT EVERY POSITION - REVERSE THE SET UP IN THE KEY BOARD AS A SECONDARY TEST.	ANS. WILL BE 1-2-3-4-5-6-7-9  9-7-6-5-4-3-2-1	ANS. MIGHT BE 1-2-3-4-5-6-7-9 1-2-3-4-6-6-7-9	
GENERAL	SET UP ALL THE 1's. TURN CRANK RAPIDLY TEN TIMES - AND SUBTRACT. CONTINUE THROUGH REST OF KEY BOARD	ANS. WILL BE 1-1-1-1-1-1-1-0	ANS. MIGHT BE 1-1-0-1-1-1-1-0 1-1-2-1-1-1-1-0	
GENERAL	SET UP ON KEY BOARD. (BEGINNING ON LEFT SIDE) 5-3-8-6-1-4-2-9. - WITH CARRIAGE AT EXTREME RIGHT. - OPERATE CRANK SO COUNTING DIALS READ FROM LEFT TO RIGHT - AS FOLLOWS 3 BLACK-2 RED-5 BLACK-2 BLACK-3 RED-1 RED-4 BLACK-3 RED. - SUBTRACT OUT - USING REVERSE TURN ETC.	ANS. SHOULD BE 1-5-3-5-9-6-2-9-7-7-5-2-2-9-7-3 REG. DIAL SHAFT.  3-2-5-2-3-1-4-3 COUNTING DIAL SHAFT 000 000 000 000 000 000 0	ANS. MIGHT BE 1-5-4-5-9-6-2-9-7-7-5-2-2-9-7-3	
GENERAL	SET UP ALL THE 9's. OPERATE CRANK AT REASONABLE FAST SPEED TEN TURNS WITH CARRIAGE AT EVERY POSITION.	ANS. SHOULD BE 9-9-9-9-9-9-9-9	ANS. MIGHT BE 1-0-0-0-0-0-9-9	

TEST	FOR	How	GOOD	BAD	REMEDY
CLUTCH DISCS	PULL	DEPRESS ALL THE 9's. - HOLD FINGER ON PLUS BAR FOR A FEW TURNS. TURN OFF SWITCH. FINGER STILL ON BAR - TURN ON SWITCH.	MACHINE STARTS PROMPTLY.	MACHINE LAGS OR WILL NOT START.	K437-A MAY BE WORN K780 1/4 A TOO WEAK OR TIGHTEN K745 1/4 A
OVERCARRY TRIP LEVER.	FUNCTION	BRING CARRIAGE TO EXTREME RIGHT - SET UP ALL THE 9's IN KEY BOARD - ADD ONCE - CLEAR KEY BOARD - DEPRESS 1-2 AT EXTREME LEFT OF KEY BOARD. DEPRESS AND HOLD MINUS BAR UNTIL MACH. STOPS - DEPRESS AND HOLD + BAR UNTIL MACH. LOCKS - SHIFT - CONTINUE TO PRESS MINUS AGAIN ETC.	A FINAL '6' IS LEFT IN AT THE 7th REG. DIAL	MACH. DOES NOT STOP WHEN IT SHOULD 'A'  MACH. STOPS WHEN IT SHOULD CONTINUE TO RUN 'B'	SEE NOTE PLATE 63 'A' OUTSIDE TRIP LEVER OUT OF ADJUSTMENT (TOO LOW) 'B' TRIP LEVER TOO HIGH CARRIAGE TOO HIGH OR TOO LOW
		SET UP 99 AT EXT. LEFT OF KEY BOARD. (CARRIAGE AT EXT. LEFT) DEPRESS AND HOLD + BAR UNTIL 1009 APPEARS. SUBTRACT UNTIL MACHINE LOCKS AND 9901 APPEARS. DEPRESS AND HOLD + BAR UNTIL MACH. LOCKS	ANS WILL BE 0000	ANS MIGHT BE 0990 (TRIP LEVER KNOCKING DOWN.)	SEE NOTE PLATE 63 OUTSIDE TRIP LEVER IS OUT OF ADJUSTMENT. (TOO HIGH)
QUICK LATCH STROKE	ALIGNMENT	DEPRESS 1 IN KEY BOARD ADD ONCE - SUBTRACT ONCE - DO THIS SEVERAL TIMES	MACH. MAKES ONE TURN AND SHOWS 1 WHEN 1 IS DEPRESSED ONCE	MACH. MAKES MORE THAN ONE TURN WHEN KEY IS DEPRESSED ONCE AND SHOWS 2-3-4-ETC	SEE PLATE 63 " 64 *386 A " 65
RELEASE LATCH STOPPING LEVER	FUNCTION				
LIFTER CYCLE STOPPING LATCH	ALIGNMENT				



# PLATE 7B

## TOOL LIST





# TOOL LIST (CONTINUED)

PLATE 79

